THE IRON AGE

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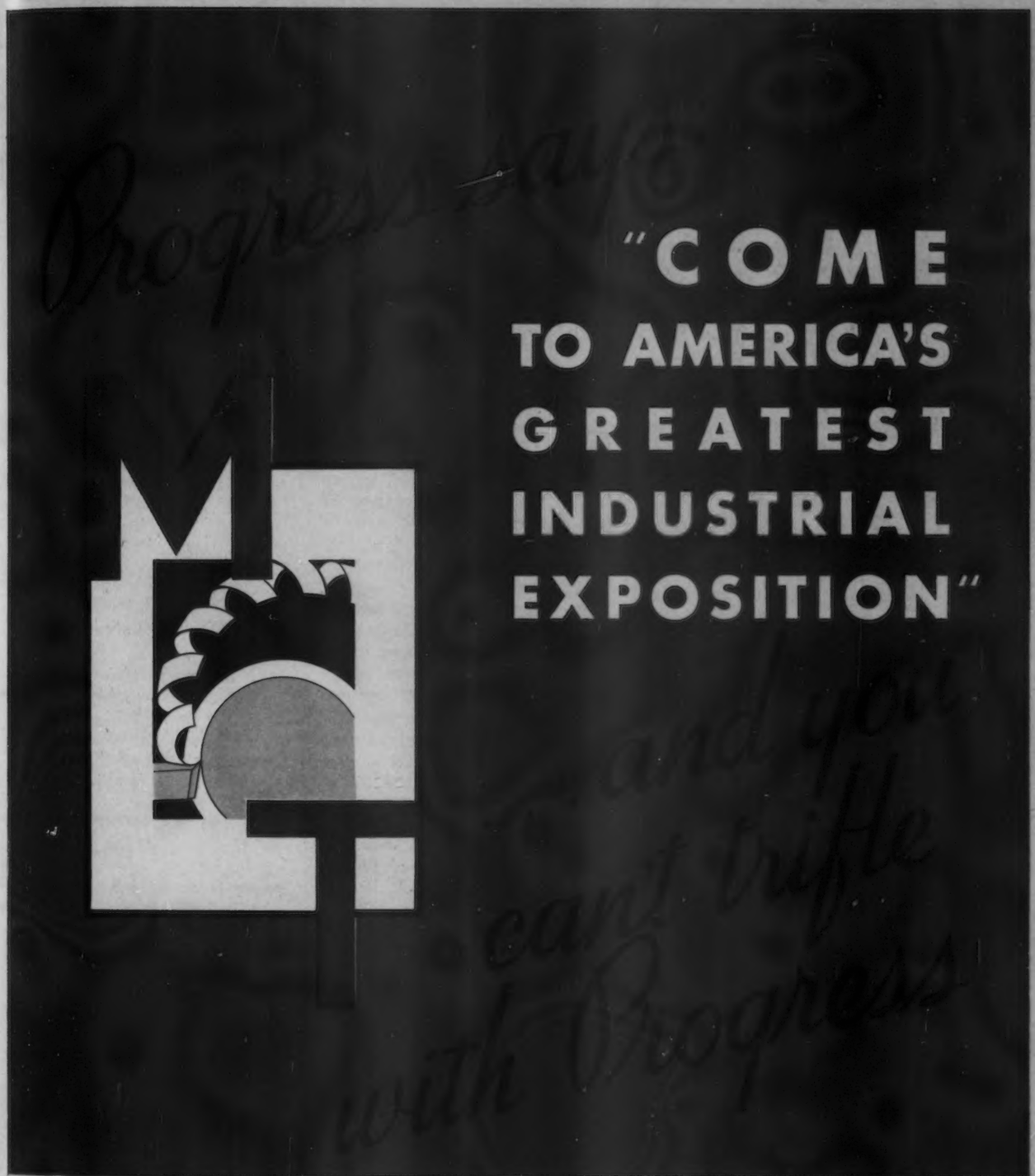

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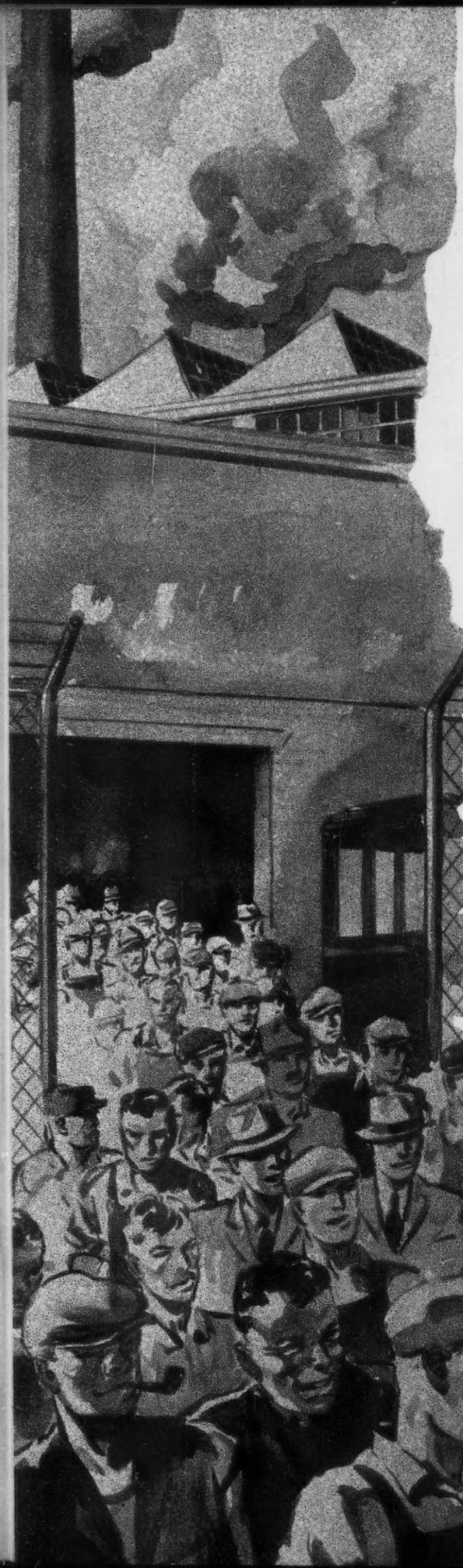


Rebuild Prosperity With Imp

THERE is a challenging statement: One of the most important factors in the restoration of our national prosperity will be new and vastly improved production machinery.

"Paradox," exclaims the pessimistic individual who believes firmly that the machine has always thrown people out of work, and that it ended by throwing the whole nation out of employment through overproduction.

As a matter of fact, we have never experienced a state of general overproduction in the United States. It is true that we have plenty of railroads and perhaps too many coal mines as well as a problem of disposing of certain agricultural surpluses. It is true that even in the palmy days of 1929 we had, in certain lines, an excess producing capacity. But this is not a general state of overproduction any more than the millions of a few very rich men would constitute a general state of excess consuming power. We cannot possibly have an excess of producing

THE machine age has not as yet arrived and there has never, even in our palmiest days, been a state of general overproduction in America! This is, indeed, a challenging statement. But it is substantiated by the facts.

Those who claim that the machine has reached its apex of use have their eyes fixed upon highly mechanized industries. They fail to appreciate that it is not what we

power in America until every one who is able and willing to work finds it possible to have a sufficiency of food, clothing, housing and a reasonable measure of command of what we term luxuries. Even if we were able to satisfy all of our 120 million people with regard to necessities—which we are not—the field of luxuries alone

With Improved Machinery . . .

By C. J. STILWELL
President, National Machine Tool Builders' Association

By C. J. STILWELL

have but what we have not that determines the future possibilities of machine utilization.

The machine age will not reach its maturity until the average man is able to satisfy all of his needs and many of his wants. And that time has not yet arrived in America. We are reaching toward it today, however, in rebuilding our prosperity with improved machines.

would enable the machine to undertake new work for many years to come.

The time-worn argument that a machine displaces hands in the performance of some specific task is obviously a truism. But that it condemns those hands to idleness is not. This has been abundantly proven during the 125 years of the so-called Machine Age. In all that time there has been no technological unemployment of noticeable extent or duration. On the contrary, growing industry has exhibited an insatiable demand for skilled workers—a demand that has usually been far greater than the supply. This state of affairs hardly supports the contention that the machines directly cause unemployment.

Growth, in industry as in Nature, is a matter of discarding old cells and adding new ones. New industries are constantly being created by advances in science, invention and technology, and new employment is created by these new industries, largely through mechanization.

Recently the National Industrial Conference Board has revealed the fact that 18 new industries which did not exist at all in 1879 absorbed almost one-seventh of all labor employed in manufacturing in 1929. New industrial cells replaced old ones and the new were bigger and better.

For one who is statistically minded there is plenty of evidence that mechanization does not breed a scarcity of jobs.

During the 35 years of the greatest activity of the machine, 1899 to 1933, the data assembled by such authoritative bodies as the U. S. Department of Commerce, National Bureau of Economic Research and National Industrial Conference Board show no conspicuous fluctuations in employment.

While the population rose from 75,000,000 to 125,000,000, an increase of two-thirds, the percentage of those gainfully employed fluctuated narrowly between 37.7 and 40.2 until after 1929. Meanwhile the percentage of factory workers varied between 6.3 and 8.6,

Dark Ages should descend upon the earth. If the experience of the past is any guide, the curves of industrial and business activity will eventually resume their ascent at the point where they turned downward into the valley of the depression. They are headed, quite decidedly, in that direction today. It takes a great deal more than a few years of extremely bad business, however widespread, to halt the onward sweep of the genius of mankind as expressed in such an unprecedented phenomenon as the Machine Age.

Granted, then, that our machine-made civilization is destined to go on for a long time to come, let us examine some of the reasons for our initial statement that improved production machinery will be an important factor in the restoration of American prosperity.

New Machines for a New Era

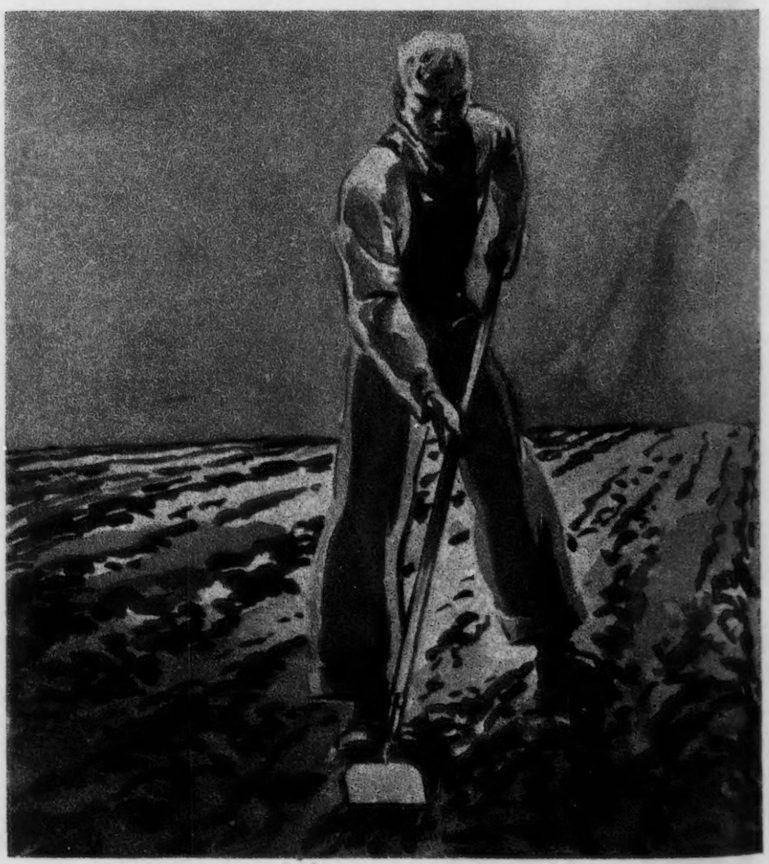
By improved production machinery is meant not only refinements of present models, but entirely new creations to perform functions of which no existing machines are capable. The machines of the immediate future thus have two great fields of development before them. One is to perform present operations much more efficiently, hence at much less cost. The other is to perform operations not now executed by machines at all. It is in these two fields of development that the potentiality of the machine, as a builder of prosperity, is at its greatest.

Consider first the effect of a sweeping increase in the efficiency of performance of production machines, from the business-building viewpoint. It is a reasonable estimate that half the production machinery of the United States has reached the replacement point in its progress toward complete obsolescence. In some industries, indeed, the forms of machines used are obsolete even though the machines themselves may be comparatively new. The equipment of the textile industry is typical. Except for some minor and a few major improvements, the machin-

the last being the figure for 1919 — a war-employment holdover, which fell the following year to 6.4.

An examination of the figures, then, reveals a surprisingly steady ratio of factory workers and all gainfully employed to the rapidly increasing population — until the period 1931 to date. To attempt an analysis of the causes of that depression period would require far more space than is here available. It is, moreover, unnecessary. Most intelligent people realize by this time that the depression was man-made, not machine made.

It is difficult, therefore, to perceive any real cogency in the unemployment arguments of the anti-machine forces. To clear the ground still further, however, there is a somewhat fatalistic argument to consider, namely: That things will never be the same again; in other words, that this period marks the end of an epoch. If that argument is valid, this day of ours would have to be the end of civilization. Now, it is as inconceivable that the appetites, wants and demands, created by the machine, should suddenly cease to exist as that a new cycle of



ery used in the average cotton mill has not changed a great deal in 50 years. The last drastic change was the substitution of the present rotary cards for the old-fashioned railroad cards more than half a century ago.

Machine Designers Have Been Busy

The replacement of the obsolete and obsolescent machines in all other industries has begun in a small way. It will go on at an increased pace as business picks up. Meanwhile, the machine designers have not been idle during the depression. Most of them have taken advantage of the opportunity to create new models and refine old ones. When these machines go to work they may well revolutionize cost and method in industry.

The other field of cost reduction by the machine is a large one, including nothing less than the total of human activities, not now aided or performed by machinery. One would think that its potentialities for mechanical application had been pretty well reduced by now and that there are few paying streaks left for the inventor. Let us see.

There is the building industry—one of the three largest—$6,000,000,000 a year at its highest. Buildings have changed a great deal, in some respects, since Babylon or Rome, but building methods have remained astonishingly primitive. We still use brick and lay them by hand; plaster and trowel it on coat by coat; paint and brush it on slowly and laboriously. We still order a lot of boards and measure, mark, cut, fit and nail them in place by hand. And so on throughout the building operation.

Courageous attempts have been made in the direction of mechanizing the construction of buildings. They have succeeded, despite the immense inertia of our building habits. A much greater measure of success may be expected when the attention of machine designers is focused more intensely upon the possibilities of the building industry.

A few years ago revolutionary

economies in agriculture on a large scale were made possible by collective farming with the aid of highly improved machinery owned in common by the operators of groups of farms. There is room for further mechanization of the planting, cultivation and harvesting of the immense acreage of the non-perishable grain and fiber crops. The machines, some of them still slumbering in the minds of their inventors, will be ready when the growers perfect their organization for raising and marketing their crops.

There is, moreover, a hitherto untouched field for the machine, in the working of perishable crops, vegetables and fruits. Even a casual observer, driving through the flat, truck-gardening acres around our great cities, must be impressed by the laborious methods of cultivation—the groups of men, women and children, toiling in the hot sun, plucking up weeds, removing insects, loosening up the soil or picking fruit and berries. Surely there must be some way of doing all these difficult chores mechanically. Inventive genius will doubtless find the answer to that

(CONTINUED ON PAGE 97)

Plant Expansion and Equipment Buying

Interest Improves In Heavier Machine Tools

WHILE there has been no great change in the rate of demand for machine tools during the week, interest has strengthened in the heavier tools such as planers and boring mills. These lines naturally respond more slowly in replacement cycles than the lighter types of tools, because of their inherently longer life. The fact that interest is increasing in these lines is therefore another indication that the modernization move in this country is a decided reality.

Builders expect that the next two weeks which are just before the big Cleveland exhibition will show a lull in actual buying, but from the rate of inquiry being maintained, there will be plenty of business done during and following the show.

NORTH ATLANTIC

Electrolux, Inc., 500 Fifth Avenue, New York, maker of vacuum cleaners, parts, etc., has let general contract to H. K. Ferguson Co., 25 West Forty-third Street, for two new two-story additions to plant on Tomac Avenue, Greenwich, Conn., 100 x 141 ft., and 61 x 64 ft. respectively, the first to be used for new factory unit and other structure for office and operating service. Cost over $100,000 with equipment.

Johns-Manville Corpn., 22 East Fortieth Street, New York, has let general contract to Peterson & Weeks, Inc., 28 North Genesee Street, Waukegan, Ill., for two one-story additions to plant on Greenwood Avenue, Waukegan, 50 x 650 ft., and 100 x 200 ft. respectively. Cost close to $200,000 with equipment.

New York Central System, 466 Lexington Avenue, New York, C. S. White, purchasing agent, asks bids until Sept. 4 for quantity of steel rails and maintenance of way supplies (Serial Contract No. 10).

Texas Co., 135 East Forty-second Street, New York, plans two new additions to oil refining plant at Port Arthur, Tex., to be used as a new solvent refining plant and as a solvent de-waxing division respectively, with capacities of 2000 and 1500 bbl. per day, in order noted. Additions are scheduled for completion early in 1936. Cost over $500,000 with machinery. F. P. Dodge is plant superintendent at Port Arthur.

Board of Warren County Supervisors, Lake George, N. Y., plans new power plant in vicinity of Bolton, N. Y. Cost over $80,000 with equipment and electrical distributing lines. Utilities Engineering Co., Inc., 1 Columbia Place, Albany, N. Y., is consulting engineer.

Signal Supply Officer, Army Base, Brooklyn, asks bids until Sept. 3 for quantity of cranks and carriers (Circular 16); until Sept. 9 for quantity of radio control boxes (Circular 8); until Sept. 16 for quantity of switches, plugs, etc. (Circular 14), for quantity of fuses (Circular 18).

Nicholas Laundry Service, Inc., New York, organized by Max Glasel, 200 St. Nicholas Avenue, and associates, has leased eight-story and basement building at 138-40 West 124th Street, on site 50 x 100 ft., and will remodel and equip for new mechanical laundry. Cost over $30,000 with machinery.

Department of Water Supply, Gas and Electricity, Municipal Building, New York, will make extensions and improvements in mechanical and repair shops in different parts of city, and similar work in connection with automobile service and garage buildings for municipal cars; a new one-story forge and blacksmith shop will be built. Fund of $547,023 has been secured through Federal aid for buildings and equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Sept. 3 for two electric arc welding sets and spare parts, and 1000 ft. welding cable (Schedule 5799), for 760 oxygen and acetylene outlet regulators (Schedule 5812), for one water-cooled, air-operated spot welder (Schedule 5774), for 1076 water gage glass fittings (Schedule 5815), for 15,000 jack knives (Schedule 5839); until Sept. 10 for two torsion meters and spare parts (Schedule 5836), for Brooklyn Navy Yard; until Sept. 6 for quantity of radiator valves, check valves and thermostatic traps (Schedule 5806), for Brooklyn, Philadelphia and Charleston navy yards; until Sept. 10 for 97 motor-operated sirens (Schedule 5802), for Brooklyn and Philadelphia yards.

Quartermaster Supply Office, Army base, Brooklyn, asks bids until Sept. 3 for 400 rolls copper wire cloth and 10 rolls aluminum wire cloth (Circular 55).

Gottfried Krueger Brewing Co., 75 Belmont Avenue, Newark, N. J., soon takes bids for new seven-story and basement addition at Belmont and West Kinney Avenues, to be equipped as main brew-house and for other service. Cost close to $185,000 with machinery. Waldemar Mortensen, 103 Park Avenue, New York, is engineer.

Board of Education, Mountain Lakes, N. J., plans manual training department in new two-story junior high school on Briarcliffe Road, for which bids have been asked on general contract. Cost about $220,000. Financing has been arranged through Federal aid. Tooker & Marsh, 101 Park Avenue, New York, are architects.

Quartermaster Depot, Twenty-first and Johnston Streets, Philadelphia, asks bids until Sept. 4 for 50 kegs wire nails, 10 kegs common nails, and six kegs finishing nails (Circular 46).

Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., manufacturer of rolling mill machinery and parts, hydraulic presses, etc., has leased former Scott Foundry of Reading Iron Co., Reading, Pa., idle for past two years, and will occupy for new branch plant.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Sept. 3 for one hydraulic power press, complete with motor-driven pump, prefilling tank, piping, etc. (Schedule 5827), for one carburizing vertical retort gas furnace (Schedule 5803), for Philadelphia Navy Yard; quantity of smoke indicators and spare parts for steam boilers (Schedule 5775), for Philadelphia and Brooklyn yards.

Central School Board, Kendall, N. Y., plans manual training department in new two-story high and grade school. Cost about $225,000. Bley & Lyman, 505 Delaware Avenue, Buffalo, are architects.

Monarch Tank & Metal Fabricating Corpn., Lackawanna, N. Y., has been organized by Kendall P. Smith and John B. Mollnow, both Perry, N. Y., to manufacture steel tanks and other steel plate products.

NEW ENGLAND

Westinghouse Electric & Mfg. Co., East Springfield, Mass., plans extensions and improvements in local plant, for increased production in electric refrigerator manufacturing division, including installation of additional equipment. Headquarters are at East Pittsburgh, Pa.

McKesson & Robbins, Inc., Grasmere Avenue, Fairfield, Conn., has asked bids on general contract for new addition. Cost over $40,000 with equipment. Albert Kahn, Inc., New Center Building, Detroit, is architect and engineer.

Gulf Refining Co., Seventh and Grant Streets, Pittsburgh, has approved plans for new bulk oil storage and distributing plant at Burlington, Vt., comprising main warehouse unit, steel tanks with capacity

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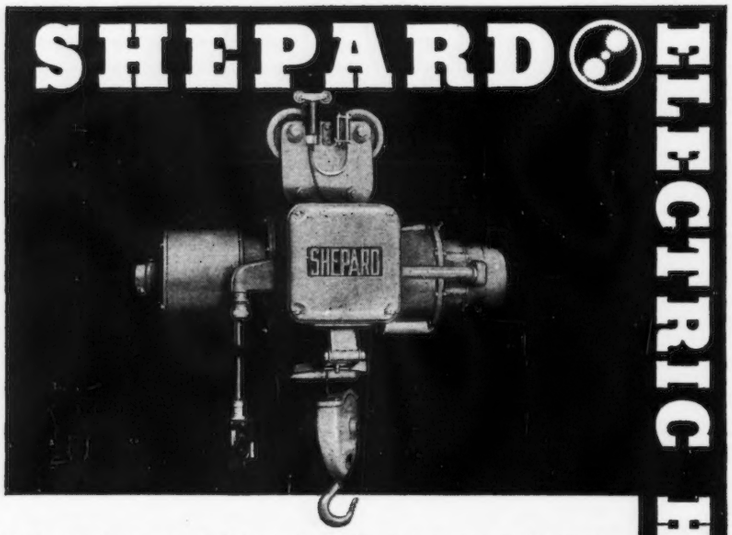

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of 3,000,000 gals., and other facilities. Cost over $60,000 with equipment.

Board of Education, Brunswick, Me., plans manual training department in new three-story and basement high school. Cost about $250,000. Financing is being arranged through Federal aid. Coombs & Harriman, 11 Lisbon Street, Lewiston, Me., are architects.

Fafnir Bearing Co., Orange Street, New Britain, Conn., has taken out a permit for one-story addition to steam power house, 20 x 50 ft.

School Board, Penacook, N. H., plans manual training department in new two-story high school. Cost about $175,000. Financing will be arranged through Federal aid. Wells, Hudson & Granger, Main Street, Hanover, N. H., are architects.

SOUTH ATLANTIC

Tide Water Power Co., Wilmington, N. C., plans construction of transmission and distributing lines in about 16 counties of State for rural electrification, totaling 400 miles, including new power line from Beaufort to coast, about 30 miles. Cost over $500,000 with power substations and service facilities. Financing is being arranged through Federal aid.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Sept. 3 for 100 aircraft propeller blades for Pensacola, Fla., Navy Station (Schedule 5842).

Dayton Rubber Mfg. Co., Dayton, Ohio, has acquired plant and business of McClaren Rubber Co., Charlotte, N. C., and will consolidate with organization. Charlotte plant will be removed to main mill at Dayton. John A. McMillan is president of purchasing company.

City Council, Avon Park, Fla., plans new electrical distributing system, with power substation, switching and other operating facilities. Cost about $75,000. George A. Main, Daytona Beach, Fla., is consulting engineer.

Construction Quartermaster, Naval Air Base, Charleston, S. C., soon takes bids for new hangar, with shop and reconditioning facilities, and other structures at local station.

WASHINGTON DIST.

Bureau of Ordnance, Navy Department, Washington, asks bids until Sept. 10 for quantity of liner, tube, gun barrel, housing and other forgings (Circular 174).

Purchasing and Contracting Officer, Holabird Quartermaster Depot, Baltimore, asks bids until Sept. 13 for quantity of automobile parts (Circular 28); until Sept. 16 for quantity of twist drills, wrenches, pliers, towing chains, screwdrivers, etc. (Circular 29).

Superintendent, Government Printing Office, Washington, plans new eight-story and basement plant addition at North Capitol and Eighth Streets, 175 x 384 ft., totaling about 484,000 sq. ft. floor space, for which an appropriation of $5,885,000 has been authorized for land, building and equipment.

Krebs Pigment & Color Corpn., Benhill Road, Curtis Bay, Baltimore, has plans for four new one-story additions. Cost over $35,000 with equipment. Company is a subsidiary of E. I. du Pont de Nemours & Co., duPont Building, Wilmington, Del.

General Purchasing Officer, Panama Canal, Washington, asks bids until Sept. 6 for quantity of malleable iron pipe fittings, wrought iron or steel pipe straps, brass or bronze pipe fittings, malleable iron unions, steam hose couplings, gate valves, throttle valves, globe valves, stop cocks and other equipment (Schedule 3083).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Sept. 3 for one motor-driven pipe-threading and cutting-off machine (Schedule 5749), two motor-driven engine lathes (Schedule 5757), one motor-driven geared-head engine lathe (Schedule 5754), quantity of seamless steel tubing (Schedule 5798), for Eastern and Western navy yards; one motor-driven, rotary type fuel oil pump (Schedule 5751), for Sewall's Point Navy Yard; one 100 kva. spot welding machine, with recorded and electronic timing device (Schedule 5771), for Washington Navy Yard.

WESTERN PA. DIST.

Erie Metal Specialties Co., Erie, Pa., recently organized by Frederick Ziesenheim, Girard, Pa., and associates, has leased local building on Peach Street, and will remodel and equip for new plant for manufacture of metal novelties.

Gulf Refining Co., Seventh and Grant Streets, Pittsburgh, has approved plans for new bulk oil storage and distributing plant on tract of land recently acquired on Cape Fear River waterfront, Fayetteville, N. C., to consist of several units, with steel tank facilities for gross capacity of 4,000,000 gals. Cost close to $100,000 with equipment.

Elkhorn Piney Coal Mining Co., Koppers Building, Pittsburgh, plans new coal-loading terminal on Wanawha River. Application has been made for Federal permission.

West Virginia Airways, Inc., Charleston, W. Va., is negotiating with city for expansion in airport facilities, including construction of hangars, with shop and reconditioning facilities. Cost over $200,000. P. D. Koontz is president.

SOUTH CENTRAL

J. A. Barry Distillery Co., Ekron, Ky., plans extensions and improvements in local distilling plant, with installation of new equipment for increased capacity. Cost over $45,000 with machinery.

Director of Purchases, TVA, Knoxville, Tenn., asks bids until Sept. 11 for one 11-ton capacity full revolving electric gantry crane for Pickwick Landing power dam.

John Wathen Distillery Co., Lebanon, Ky., has plans for new addition to plant for storage and distribution, with capacity of about 20,000 bbl. Cost over $75,000 with equipment.

Board of Education, Nashville, Tenn., plans training department in new two-story and basement high school, for which bids will be asked soon on general contract. Cost about $500,000. Donald Southgate, Nashville Trust Building, is architect.

City Council, Lexington, Ky., Charles W. Fithian, city manager, plans new hangar at municipal airport, with repair and reconditioning facilities. Financing has been arranged through Federal aid. J. W. Guyn is city engineer in charge.

Lee County Power Association, Opelika, Ala., plans construction of new transmission and electrical distributing lines for service in rural districts of county, totaling about 70 miles, with power substation and operating facilities. Fund of $63,000 is being arranged through Federal aid for project.

SOUTHWEST

Longwear Paint & Varnish Co., 301 Broadway, Kansas City, Mo., has asked bids on general contract for new one-story addition, 40 x 100 ft. Cost about $35,000 with equipment. Clifton B. Sloan, Ninth Street and Baltimore Avenue, is architect.

Purchasing Officer, Department of Interior, Washington, asks bids until Sept. 3 for eight road plows for Muskogee, Okla. (Proposal 922).

Board of Trustees, Arkansas State College, Jonesboro, Ark., soon takes bids on revised plans for new power plant, engineering building and other structures. Cost over $350,000 with equipment. A. N. McAninch, Pyramid Life Building, Little Rock, Ark., is architect.

Common Council, Pauls Valley, Okla., has plans for new municipal electric light and power plant, and electrical distribut-

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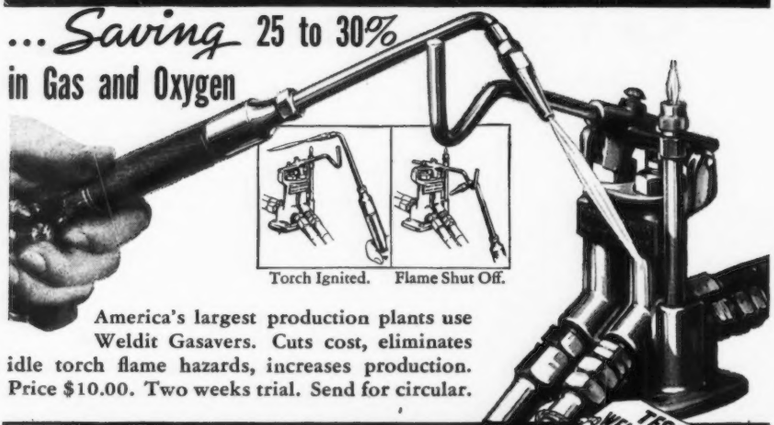

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TEST THIS WELDIT GASAVER FREE FOR TWO WEEKS IN YOUR PLANT

ing system. Cost $257,000 with equipment. Financing has been arranged through Federal aid. V. V. Long & Co., Colcord Building, Oklahoma City, Okla., are consulting engineers.

Board of Education, Columbia, Mo., plans two new manual training shops, to be located at Jefferson junior high and Hickman high school respectively. Financing will be carried out through Federal aid. Deering & Clark, Haden Building, are architects.

Common Council, Phillipsburg, Kan., has plans for new municipal electric light and power plant, using Diesel engine-generator units, with electrical distributing system. Fund of $120,000 has been secured through Federal aid. Paulette & Wilson, Farmers Union Building, Salina, Kan., are consulting engineers.

City Council, Port Lavaca, Tex., has plans for new municipal cannery and processing plant for fish food. Fund of $140,000 has been secured through Federal aid for building and equipment.

Board of Education, San Antonio, Tex., plans manual training department in new three-story high school in north side district, for which bids will be asked soon on general contract. Cost about $200,000. A. B. and R. M. Ayers, Smith-Young Tower, and Adams & Adams, Insurance Building, are associated architects; Mathews & Kenan, Smith-Young Tower, are mechanical engineers.

City Council, Temple, Tex., plans new municipal airport on 80 acres, including hangar with repair and reconditioning facilities, oil storage and distributing building, and other field units. Cost over $60,000 with equipment.

MICHIGAN DISTRICT

Zenith-Detroit Corpn., foot of Hart Avenue, Detroit, manufacturer of carburetors, parts and kindred automotive equipment, has asked bids for new one-story addition, including improvements in present plant. Cost about $50,000 with equipment. Leonard Willeke, 16934 Village Lane, is architect.

Chevrolet Motor Co., 3044 West Grand Boulevard, Detroit, has begun superstructure for new one-story addition to branch plant at Saginaw, Mich., 80 x 740 ft., comprising former crankshaft works of General Motors Corpn., and to be operated in future as Plant No. 2. It will be equipped for production of bumpers, heat-treating of forgings and kindred parts. Cost over $200,000 with machinery.

Gorney Brewing Co., Flint, Mich., recently organized, has acquired local building at Poplar and Walnut Streets, totaling about 60,000 sq. ft. floor space, and will remodel and equip for new brewery. Cost over $45,000 with machinery. Edward A. Gorney, formerly connected with Flint Hill Brewing Co., heads new organization, which is capitalized at $250,000.

Mergraf Oil Refinery, 3757 Bellevue Avenue, Detroit, is planning construction of two new branch processing plants, one to be located in vicinity of New Work and other at Los Angeles for East and West coast service respectively, for manufacture of lubricating oil products. Each plant will have capacity of about 100,000 gal. per month, and will cost over $75,000 with equipment. H. G. Holmes is president.

MIDDLE WEST

Oscar W. Hedstrom Pattern Works, 1419 West Carroll Avenue, Chicago, has acquired one-story building, 100 x 125 ft., at 4836-42 West Division Street, and will occupy for new machine works and pattern shop.

Abbott Laboratories, Inc., North Chicago, manufacturer of industrial and other chemical products, has asked bids on general contract for new two-story addition, 80 x 280 ft. Cost over $100,000 with equipment.

District Quartermaster, Fort Des Moines, Des Moines, Iowa, asks bids until Sept. 3 for 840 fire shovels, 840 coal hods, 600 stove pokers, etc. (Circular 34).

Tobin Packing Co., Inc., Fort Dodge, Iowa, meat packer, has let general contract to W. A. Klinger, Inc., Warnock Building, Sioux City, Iowa, for new two-story and basement addition, 64 x 64 ft. Cost about $50,000 with equipment. F. M. Tobin is president.

Mill Tailings Recovery Co., Colorado Springs, Colo., Albert V. Hagen, president, has plans for new one-story cyanide mill at gold-mining properties in vicinity of Colorado Springs, to be equipped for handling about 500 tons of crude ore at one time. Cost about $100,000 with machinery. Financing has been arranged through RFC. Edward L. Sweeney, United States National Bank Building, Denver, Colo., is consulting engineer in charge.

United States Engineer Office, Commerce Building, St. Paul, Minn., asks bids until Sept. 5 for power, control and electric systems for lock and dam No. 7, Mississippi River, near Dresbach, Minn., including transformers and regulators, remote control switch cabinets, limit switches, lock grounding system, dam power feeders, dam conduit system, gasoline-electric standby station unit with complete accessories, air signal equipment, portable lighting units, one hand-operated traveling bridge crane, central control station feeders and other equipment.

Board of Education, Glenwood, Ill., has let general contract to E. L. Lonergan Construction Co., 203 North Wabash Avenue, Chicago, for one-story addition to Glenwood manual training school. Cost about $30,000 with equipment. Edwin H. Clark, 8 East Huron Street, Chicago, is architect.

Chapman-Doake Co., East Main Street and Broadway, Decatur, Ill., plans rebuilding of portion of flour and feed-milling plant, recently destroyed by fire. Loss close to $100,000 with machinery.

OHIO AND INDIANA

Board of Education, Ashland, Ohio, plans new one-story vocational training shop at local high school. Fund of $65,000 is being arranged by bond issue.

National Mortar & Supply Co., Woodville, near Fremont, Ohio, has approved plans for extensions, including storage bins and mechanical-handling facilities. Cost over $100,000 with equipment.

Efficient Tool & Die Co., 9314 Elizabeth Avenue, Cleveland, has plans for new one and two-story addition, 60 x 81 ft. Cost about $30,000 with equipment. H. M. Morse & Co., 827 Prospect Avenue, are architects and engineers.

City Council, Painesville, Ohio, is considering new municipal steam power plant for central heating service in public buildings and other structures in downtown district. Cost about $150,000 with pipe line distributing system. Financing will be arranged through Federal aid.

Marsh Wall Tile Co., Dover, Ohio, composition sheet wall tiling, etc., plans rebuilding of portion of plant recently destroyed by fire. Loss over $75,000 with machinery.

Air Corps, Patterson Field, Fairfield, Ohio, asks bids until Sept. 3 for one airplane cylinder grinding machine (Circular 13).

American Brass Mfg. Co., 1525 East Forty-ninth Street, Cleveland, has let general contract to J. L. Schoeffel, 10425 Baltic Road, for new one-story top addition to present plant, 60 x 145 ft. Cost close to $40,000 with equipment.

Contracting Officer, Material Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until Sept. 5 for 30,000 ft. rubber-covered flexible cable, 330,000 ft. tinned copper braid, 388,500 ft. aircraft power and lighting cable (Circular 113); until Sept. 6 for generator assemblies in lots of 237 to 900 (Circular 110), 220,000 ft. high-tension ignition cable (Circular 112), 214 electric drills (Circular 121); until Sept. 9 for quantity of automatic airship valve assemblies (Circular 119).

Muncie Malleable Foundry Co., Muncie, Ind., plans extensions and modernization in plant, with installation of new equipment. Cost about $100,000 with machinery.

Southern Indiana Gas & Electric Co., Evansville, Ind., plans expansion in power plant, with installation of additional equipment, and extensions and improvements in power lines and distribution facilities. Cost $851,000 with equipment. Application has been made for permission.

Contracting Officer, Quartermaster Corps, Jeffersonville, Ind., asks bids until Sept. 11 for electric drills, grinders, riveting hammers, oxy-acetylene torches, tool grinders, saws, air and water gun, motor stands, wrenches and other tools (Circular 25).

PACIFIC COAST

Link Belt Co., 400 Paul Street, San Francisco, has let general contract to Austin Co. of California, 516 Eighteenth Street, Oakland, Cal., for extensions and improvements in plant. Cost about $25,000.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until

Only 4 words

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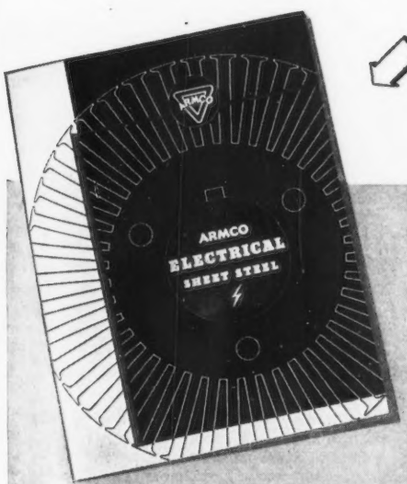
bigger profits for you

Send your electrical sheet steel requirements to Armco—for easier, faster and more profitable production of equipment that's the peak in efficient performance. There is a correct Armco grade for every conceivable specification. Behind it is the 35-year-old experience of the pioneer producer of electrical sheet steel, the complete metallurgical research facilities, and the modern production equipment that insures quick deliveries of entirely satisfactory sheets. We'll be glad to talk over any problem with you. Just say the word.



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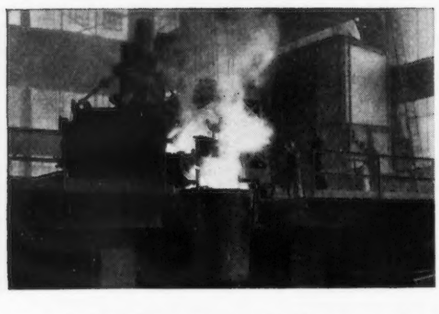


FORGINGS

CARBON-ALLOY AND SPECIAL BASIC ELECTRIC STEELS

COMPLETE control of all processing from selection of the melting charge to the finished condition is the N. F. & O. *guarantee of quality* in forgings furnished to your specifications—Smooth Forged, Hollow Bored, Rough or Finish Machined.

NATIONAL FORGE AND ORDNANCE CO.

IRVINE, WARREN COUNTY, PENNA., U. S. A.

Sept. 6 for one motor-driven grinder, tool and cutter machine for Mare Island, Cal., Navy Yard (Schedule 5796); until Sept. 13 for four electric whip hoists and spare parts for Puget Sound, Wash., Navy Yard (Schedule 5746).

Ray Becker Sheet Metal Co., Portland, manufacturer of sheet metal products, has leased new one story building, 100 x 120 ft., to be erected at Paige and Borthwick Streets by Allen H. McCurtain, Portland. Cost about $35,000 with machinery. Joseph W. Heiler, Henry Building, is architect in charge.

Purchasing Officer, Department of Interior, Washington, asks bids until Sept. 4 for 1280 spools galvanized cattle-type barbed wire for Casa Grande, Ariz.; 304 spools barbed wire for Cedar City, Utah; 128 spools barbed wire for Gold Hill, Utah; 27,560 steel fence posts and 600 lb. galvanized staples (Proposal 895).

Municipal Light Department, 302 City Hall, Pasadena, Cal., Benjamin F. De Lanty, general manager, asks bids until Sept. 5 for quantity of metal-clad switchgear for Maryland power substation.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Aug. 27 for one four-wheel type industrial tractor for Oakland, Cal. (Schedule 5746); until Sept. 3 for 60 portable electric drills for Mare Island, Cal., Navy Yard (Schedule 5761).

Linde Air Products Co., 2305 East Fifty-second Street, Los Angeles, has let general contract to Austin Co. of California, 777 East Washington Street, for new one-story addition for storage and distribution, 60 x 100 ft. Cost about $30,000 with equipment.

Beringer's Winery, Inc., St. Helena (Napa County), Cal., has let general contract to Harry Thorsen, 1519 Kearney Street, for new distilling plant, comprising three main one-story units, 36 x 85 ft., for distillery; 25 x 85 ft., for fermenting department; and 42 x 100 ft., for storage and distribution. Cost close to $45,000 with equipment.

Metropolitan Water District, 306 West Third Street, Los Angeles, asks bids until Dec. 3 for motor-driven centrifugal pumping units and auxiliary equipment for main pumping stations on Colorado River Aqueduct (Specification 116).

Wheeler-Osgood Corpn., Tacoma, Wash., plans rebuilding of portion of plywood and hardwood mill recently destroyed by fire, including shops, boiler plant and other units. Loss over $500,000 with equipment.

Board of Education, City and County of San Francisco, City Hall, Civic Center, plans new one-story machine shop at George Washington school. Cost about $25,000 with equipment. Miller & Pflueger, 580 Market Street, are architects.

FOREIGN

St. Thomas Bronze Co., First Avenue, St. Thomas, Ont., has plans for two new one-story additions for which superstructures will begin in September, 25 x 100 ft. and 25 x 85 ft. Cost over $50,000 with equipment. William Dalziel is general manager.

Mond Nickel Co., Ltd., London, England, affiliated with International Nickel Co., 67 Wall Street, New York, plans new addition to plant at Clydach, Wales, including expansion in refinery at that place; a new experimental and research laboratory will be constructed at Birmingham, England. Entire project will cost about $700,000 with equipment.

City Council, Johannesburg, South Africa, plans additions to municipal artificial gas plant, including installation of three new 1,500,000 cu. ft. capacity gas holders, electrostatic tar precipitation equipment with capacity of 6,000,000 cu. ft. daily, boilers and other equipment. Cost over $400,000. Proposed to ask bids soon.

Industrie Chimiche Meridionali, S. A., Milan, Italy, manufacturer of industrial chemicals, plans addition to plant, comprising several one-story units for large increase in capacity. Cost over $350,000 with machinery. A concession for project has been secured.

Acid-Resisting Metals, Ltd., London, England, recently organized, has taken over former Redheugh Foundry, Ltd., Dunston, near Gateshead-on-Tyne, England, idle for a number of years past, and will remodel and equip for new works for production of acid-resisting alloys.

Link-Belt Co., and subsidiaries, for the six months ended June 30, report net profit of $530,584. This is equal to 62c. a share on the common stock after dividends on preferred stock. In the corresponding period of 1934, net profit was $378,739.

Trade Notes

Ashton Valve Co. announces the appointment of the Steam Equipment Manufacturing Co., Jenkins Arcade Building, Pittsburgh, as distributors in the Pittsburgh area for the Ashton safety and relief valves, pressure gages, etc.

Falls Clutch & Machinery Co. has moved its New York City branch, managed by F. R. Brautigam, from 172 Chambers Street to 75 Warren Street. The company is owned and operated by the Kent Machine Co., Cuyahoga Falls, Ohio.

Wrought Washer Mfg. Co. of Milwaukee, manufacturers of washers and stampings, through its Los Angeles sales agents, the Western Washer & Mfg. Co., is expanding its range of service in California and adjacent territory. The Western Washer & Mfg. Co. is moving this month into larger quarters located at 2111 E. 51st St., Los Angeles, California, where new cost-reducing machinery for making washers is being installed and production facilities are being generally enlarged. Added warehouse space is also being provided for the maintenance of more varied and larger stocks of both standard and special washers. This property is serviced by a private spur track to facilitate carload shipments.

Avery and Saul Co. of South Boston, Mass., have been appointed distributors of seamless steel and Toncan iron boiler tubes for the Globe Steel Tubes Co.

Ingersoll Milling Machine Co., Rockford, Ill., has appointed the J. H. Ryder Machinery Co., Toronto, to handle the sale of its cutters in the Ontario district, and the T. E. Ryder Machinery Co., Montreal, in Quebec and Eastern Canada.

American Electric Furnace Co., Boston, has appointed Carman Adams, Inc., 2970 West Grand Boulevard, Detroit, direct factory representative for Michigan.

Walker & Downing, advertising agency, Oliver building, Pittsburgh, specializing in industrial accounts, announces that effective Aug. 1, the J. B. Rogers Advertising Agency, also of Pittsburgh, merged with the Walker & Downing company.

New Trade Publications

Insulation.—Johns-Manville Corpn., 22 East Fortieth Street, New York. Booklet entitled "Barriers to Industrial Waste," with table of recommendations for insulating materials covering heating and power, ovens and dryers, heat treating furnaces, steel mill, refrigerating, brewery and other equipment.

Hoist Buckets.—Industrial Brownhoist Corpn., Bay City, Mich. Catalog No. 353. Gives picturized applications in many industrial uses. Tables of capacities, weights, dimensions, etc. Details of grab buckets, grapples and various types of buckets.

Combustion Control System.—Bailey Meter Co., Cleveland. Thirty-two page bulletin describing a complete combustion control system designed to automatically maintain steam pressure, combustion efficiency and furnace draft. Diagrams and photographs illustrate how the system may be applied to boilers ranging in size from 200 hp. up, and fired either with fuels in suspension or with stokers.

JUST BETWEEN US TWO

Into the Black by October

CLEVELAND and Chicago hotels now in the red will be out within five weeks. For the Machine Tool Exposition (Cleveland, Sept. 11-21) and the National Metal Exposition (Chicago, Sept. 30-Oct. 4) promise to establish post-depression and perhaps all-time attendance records.

If a man put his shoulders to it, he could make a convention trip unprofitable, but he would have to try very hard. Ninety-nine out of a hundred get enough sound ideas and inspiration to make the trip investment as remunerative as a share in the original Ford Motor Co.

There is something about rubbing elbows with men doing and worrying about the same things that removes carbon from mental valves and makes the cerebellum hum like a V-16.

Every time your brain reaches its absorption limit and your arches begin to groan, drop in at The Iron Age booth. If you look as if you wanted a few minutes to yourself, we won't even talk to you, except on invitation.

Floored

JUST one of the army of 14 Just-Between-Us-Two-ers ventured a solution of Mr. Dutton's fisherman-hat-stream problem (Aug. 15 IA, p. 114), and that solution was incorrect. The office mathematical genius says the stream flows three miles per hour, that it takes the fisherman exactly as long to get back to the hat as it took him to get away from it, and that if you use the familiar freight train analogy it will be as plain as the nose on Durante's face.

You're Wrong, Sezzee

DURING the painful post-vacation process of working ourselves back into the groove, our percentage of error rises sharply above its normal high. We made, for example, the stupid mistake of addressing Smith-Armstrong Forge, Inc., Cleveland, as a non-subscriber. E. L. Armstrong, secretary-treasurer, corrects us pleasantly:

"We have been subscribers several years, and wouldn't be without The Iron Age."

Tip for the Machine Tool Builders

IF we were running the Machine Tool Exposition we would have this quotation from Dewing's "Financial Policy of Corporations" displayed on a signboard 30 ft. high:

"The great majority of business . . . should invest the surplus where the return is largest. This is in the business itself. . . . And if, led by a foolish and childish conservatism, they invest their surplus in high-grade securities, such as municipal and government bonds, they are taking a lower rate of return than the money invested in their own business ought to bring; and if this is not so, the business should be liquidated and the services of the officers dispensed with."

We copped that from an ad the alert, successful *New York News* ran recently in Printers' Ink.

A Picture Is Worth . . .

A BOUQUET to U. S. Steel Corporation Subsidiaries for that dramatic composite photograph in the double-page spread headed, "This Dead Head Rides on Every Train" (Aug. 15 Iron Age, pp. 102-3).

Chest Thrown Out

"WHAT I marvel at," said a recent visitor, "is how you manage to get out an issue of that size every week." We had just done him a favor, which may have distended his admiration beyond normal size.

But it was a fine opening; the Oberleutnant was away for the day, too. So we shot the works, and told him what a comprehensive, experienced, nationwide editorial staff we have; how we print more editorial pages than any other trade paper; how this reflects itself in high reader-interest; how high reader-interest enables us to carry more advertising than any other trade paper.

He seemed to be impressed.

Look, Mr. Ripley!

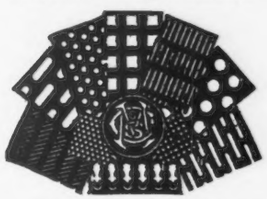
IN our tiresome trip through Dun-Bradstreet's we find that Tyler County, W. Va., has the patly named town of Little, pop. 55. But Little is London compared with Nicholas County's Gad, pop. 15. Gad has no traffic problem. Gadders can always find a place to park, but nothing to park in front of.—A.H.D.

MUNDT
PERFORATED METALS

Large stocks of all metals always in hand ready to punch for any arrangement of perforations.

Sixty-one years of manufacturing perforated metals for every conceivable purpose assures satisfaction.

Write for Catalog of Patterns



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CHARLES MUNDT & SONS
59 FAIRMOUNT AVE., JERSEY CITY, N. J.

There's CONVENIENCE for you in Hendrick's COMPLETE line

Making Hendrick your perforated metal headquarters will assure you not only fine quality plate and an unusual standard of service but also the convenience of the "complete line" when you have an uncommon problem.

HENDRICK MFG. CO.
37 Dundaff Street, Carbondale, Pa.
SALES OFFICES IN PRINCIPAL CITIES
PLEASE CONSULT TELEPHONE DIRECTORY
Manufacturers of Mitco Open Steel Flooring; Elevator Buckets; Light and Heavy Steel Plate Construction

Cone 4-Spindle Automatics

Are economical and accurate producers of screw machine parts up to 6" diameter, 7" milling length. They cut costs, increase production, boost profits.

Write for particulars

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Chicago: John H. Glover, 2127 North Sayre Ave., Chicago, Ill.
Ohio: S. B. Martin, 1077 Erie Cliff Drive, Lakewood, Ohio.
New England: Potter & Johnston Machine Co., Pawtucket, R. I.
Indiana: G. A. Richey, Chamber of Commerce Bldg., Indianapolis, Ind.
New York State: Syracuse Supply Co., Syracuse, N. Y.; also Rochester, N. Y.
Pennsylvania: Arch Machinery Co., 1005 Park Bldg., Pittsburgh, Pa.
Philadelphia: Lloyd & Arms, Inc., 133 South 36th St., Philadelphia, Pa.
California: C. F. Bulotti Machinery Co., 829-831 Folsom St., San Francisco, Calif.

"LUCAS PRECISION"

Horizontal Boring, Drilling and Milling Machine

THE LUCAS MACHINE TOOL CO.

NOW AND ALWAYS OF

CLEVELAND, OHIO, U. S. A.

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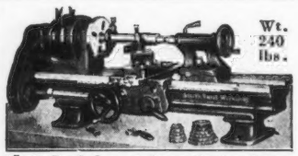
Drilling Machinery

Belt and Motor Spindle

One to Six Spindles

Tapping Attachments and Multiple Heads



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9"x3' Back-Geared, Screw Cutting "Workshop" Bench Lathe..... $75

SOUTH BEND LATHES

96 other sizes and types of Back-Geared, Screw Cutting Lathes from 9" to 18" swing, $75 to $1500, on terms if desired, shown in new General Catalog No. 94. Write for copy.

South Bend Lathe Works

593 E. Madison St., South Bend, Indiana, U. S. A.

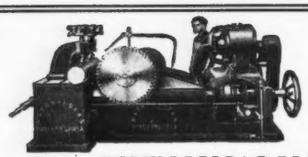
17 STYLES AND SIZES

MERRELL

for BETTER threads

PIPE THREADING MACHINES

TOLEDO, OHIO



Cutting Off Machines for Sawing All Kinds of Metals

THE ESPEN-LUCAS MACHINE WORKS

FRONT AND GIRARD AVE. PHILADELPHIA, PENNA.

MARVEL METAL BAND SAW MACHINES

Marvel Ball Bearing High Speed Hack Saws. Plain Shop Saws. High Speed Edge Hack Saw Blades and Hole Saws. Punches, Shears, Rod Cutters, Drill Press Vises. Write Us Today.

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ABRASIVE WHEELS — See Grinding Wheels

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Wood, R. D., & Co., Philadelphia.

ACETYLENE—Dissolved in Cylinders
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

ACID RECOVERY EQUIPMENT
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ALLOYS—Vanadium
Vanadium Corp. of America, 120 Broadway, N. Y. C.

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Pacific Coast Steel Corp., San Francisco, Calif.
Ryerson, Jos. T., & Son, Inc., Chicago.
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Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.
Weirton (W. Va.) Steel Co.

ANGLES, BEAMS, CHANNELS & TEES —Magnesium Alloys
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Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.
Hartford (Conn) Steel Ball Co., The.

BALLS—Steel, Brass or Bronze
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.
Fafnir Bearing Co., New Britain, Conn.
Hartford (Conn) Steel Ball Co., The.
New Departure Mfg. Co., Bristol, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.

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Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

BANDS—Welded
Amer. Welding & Mfg. Co., Warren, O.

BARREL COATING & RENOVATING MACHINES
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.

BARRELS—Burnishing
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.

BARRELS—Tumbling
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BARS—Aluminum.
Aluminum Co. of America, Pittsburgh.

BARS—Brass, Bronze or Copper
Bunting Brass & Bronze Co., Toledo, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.

BARS—Cold Drawn
Union Drawn Steel Co., Massillon, Ohio.

BARS—Concrete, Reinforcing
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Laclede Steel Co., St. Louis, Mo.
Pacific Coast Steel Corp., San Francisco, Calif.
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

BARS—Magnesium Alloys
Dow Chemical Co., 921 Jefferson Ave., Midland, Mich.

BARS—Steel
Ames, W., & Co., Jersey City, N. J.
Andrews Steel Co., The, Newport, Ky.
Bethlehem (Pa.) Steel Company.
Carnegie Steel Co., Pittsburgh.
Illinois Steel Co., Chicago.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Republic Steel Corp., Youngstown, Ohio.
Ryerson, Joseph T., & Son, Inc., Chicago.
Steel & Tubes, Inc., Cleveland.
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Co., The, Canton, O.
Weirton (W. Va.) Steel Co.
Youngstown (Ohio) Sheet & Tube Co., The.

BASES—Column, Machinery
Lukens Steel Co., Coatesville, Pa.

BATTERIES—Storage
Electric Storage Battery Co., The, Phila.
Gould Storage Battery Corp., Depew, N. Y.

BATTERY CHARGERS
Cutler-Hammer, Inc., Milwaukee.

BEAMS—See Angles, Beams, Channels and Tees

BEARINGS—Ball
Bantam Ball Bearing Co., The, South Bend, Indiana.
Fafnir Bearing Co., New Britain, Conn.
Federal Bearings Co., Inc., Poughkeepsie, N. Y.
New Departure Mfg. Co., Bristol, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.

BEARINGS—Brass and Bronze
Bunting Brass & Bronze Co., Toledo, O.
Ryerson, Jos. T., & Son, Inc., Chicago.

BEARINGS—Oilless
Bunting Brass & Bronze Co., Toledo, Ohio.
Rhoades, R. W. Metaline Co., Inc., Long Island City, N. Y.

BEARINGS—Quill
Bantam Ball Bearing Co., The, South Bend, Indiana.

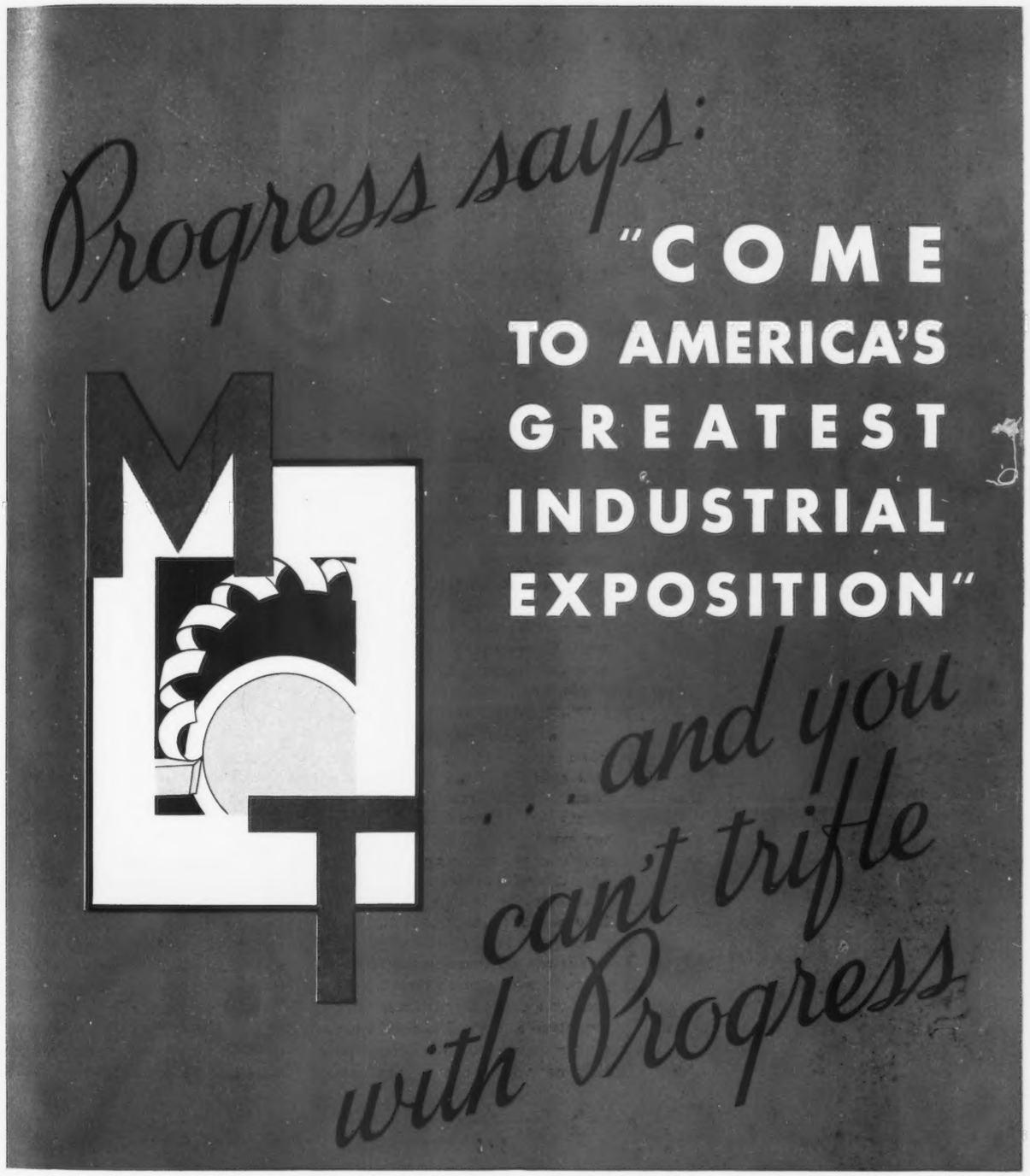
BEARINGS—Radial
Bantam Ball Bearing Co., The, South Bend, Indiana.
Fafnir Bearing Co., New Britain, Conn.
Federal Bearings Co., Inc., Poughkeepsie, N. Y.
Hyatt Roller Bearing Co., Newark, N. J.
New Departure Mfg. Co., Bristol, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.

BEARINGS—Roll Neck
Bantam Ball Bearing Co., The, South Bend, Indiana.
S K F Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Roller
Bantam Ball Bearing Co., The, South Bend, Indiana.
Hyatt Roller Bearing Co., Newark, N. J.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Roller Tapered
Bantam Ball Bearing Co., The, South Bend, Indiana.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Rolling Mill Equipment
Bantam Ball Bearing Co., The, South Bend, Indiana.
S K F Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Timken Roller Bearing Co., The, Canton, O.



MACHINE TOOL SHOW

CLEVELAND

SEPTEMBER 11—21, 1935

Sponsored by NATIONAL MACHINE TOOL BUILDERS' ASSOCIATION

Rebuild Prosperity With Im

HERE is a challenging statement: One of the most important factors in the restoration of our national prosperity will be new and vastly improved production machinery.

"Paradox," exclaims the pessimistic individual who believes firmly that the machine has always thrown people out of work, and that it ended by throwing the whole nation out of employment through overproduction.

As a matter of fact, we have never experienced a state of general overproduction in the United States. It is true that we have plenty of railroads and perhaps too many coal mines as well as a problem of disposing of certain agricultural surpluses. It is true that even in the palmy days of 1929 we had, in certain lines, an excess producing capacity. But this is not a general state of overproduction any more than the millions of a few very rich men would constitute a general state of excess consuming power. We cannot possibly have an excess of producing power in America until every one who is able and willing to work finds it possible to have a sufficiency of food, clothing, housing and a reasonable measure of command of what we term luxuries. Even if we were able to satisfy all of our 120 million people with regard to necessities—which we are not—the field of luxuries alone

THE machine age has not as yet arrived and there has never, even in our palmiest days, been a state of general overproduction in America! This is, indeed, a challenging statement. But it is substantiated by the facts.

Those who claim that the machine has reached its apex of use have their eyes fixed upon highly mechanized industries. They fail to appreciate that it is not what we

Improved Machinery . . .

By C. J. STILWELL
President, National Machine Tool Builders' Association

By C. J. STILWELL

have but what we have not that determines the future possibilities of machine utilization.

The machine age will not reach its maturity until the average man is able to satisfy all of his needs and many of his wants. And that time has not yet arrived in America. We are reaching toward it today, however, in rebuilding our prosperity with improved machines.

would enable the machine to undertake new work for many years to come.

The time-worn argument that a machine displaces hands in the performance of some specific task is obviously a truism. But that it condemns those hands to idleness is not. This has been abundantly proven during the 125 years of the so-called Machine Age. In all that time there has been no technological unemployment of noticeable extent or duration. On the contrary, growing industry has exhibited an insatiable demand for skilled workers—a demand that has usually been far greater than the supply. This state of affairs hardly supports the contention that the machines directly cause unemployment.

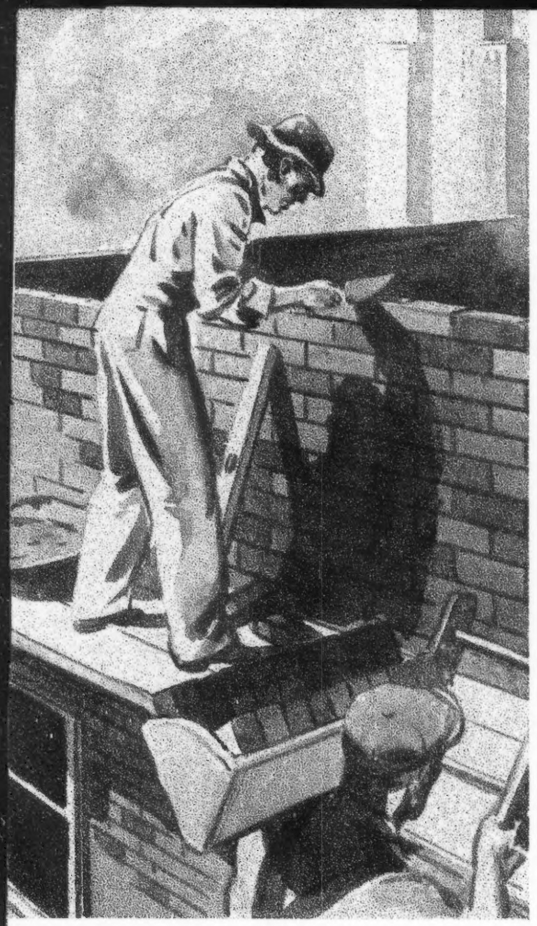
Growth, in industry as in Nature, is a matter of discarding old cells and adding new ones. New industries are constantly being created by advances in science, invention and technology, and new employment is created by these new industries, largely through mechanization.

Recently the National Industrial Conference Board has revealed the fact that 18 new industries which did not exist at all in 1879 absorbed almost one-seventh of all labor employed in manufacturing in 1929. New industrial cells replaced old ones and the new were bigger and better.

For one who is statistically minded there is plenty of evidence that mechanization does not breed a scarcity of jobs.

During the 35 years of the greatest activity of the machine, 1899 to 1933, the data assembled by such authoritative bodies as the U. S. Department of Commerce, National Bureau of Economic Research and National Industrial Conference Board show no conspicuous fluctuations in employment.

While the population rose from 75,000,000 to 125,000,000, an increase of two-thirds, the percentage of those gainfully employed fluctuated narrowly between 37.7 and 40.2 until after 1929. Meanwhile the percentage of factory workers varied between 6.3 and 8.6.



Dark Ages should descend upon the earth. If the experience of the past is any guide, the curves of industrial and business activity will eventually resume their ascent at the point where they turned downward into the valley of the depression. They are headed, quite decidedly, in that direction today. It takes a great deal more than a few years of extremely bad business, however widespread, to halt the onward sweep of the genius of mankind as expressed in such an unprecedented phenomenon as the Machine Age.

Granted, then, that our machine-made civilization is destined to go on for a long time to come, let us examine some of the reasons for our initial statement that improved production machinery will be an important factor in the restoration of American prosperity.

New Machines for a New Era

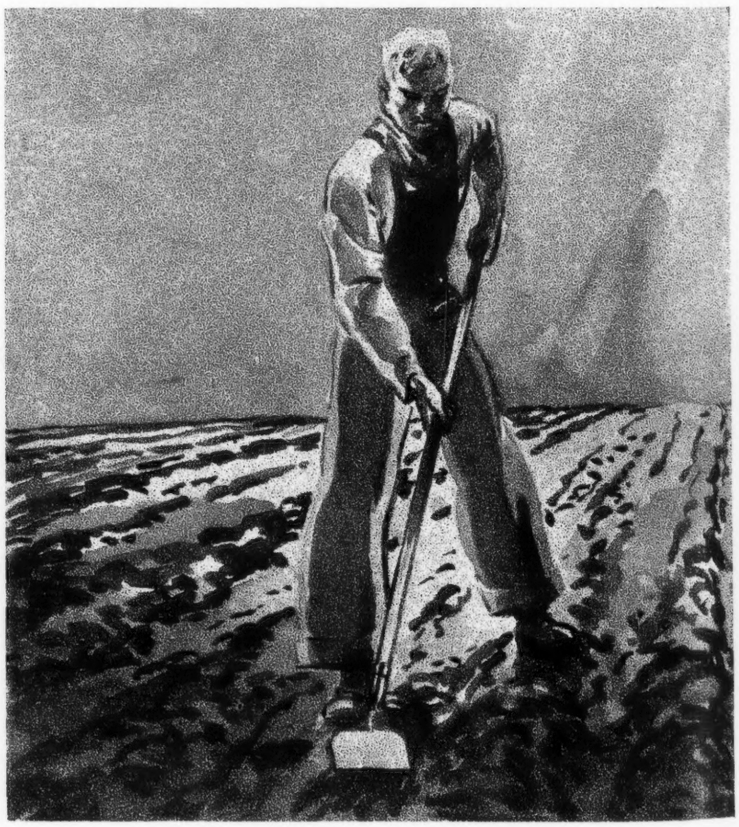
By improved production machinery is meant not only refinements of present models, but entirely new creations to perform functions of which no existing machines are capable. The machines of the immediate future thus have two great fields of development before them. One is to perform present operations much more efficiently, hence at much less cost. The other is to perform operations not now executed by machines at all. It is in these two fields of development that the potentiality of the machine, as a builder of prosperity, is at its greatest.

Consider first the effect of a sweeping increase in the efficiency of performance of production machines, from the business-building viewpoint. It is a reasonable estimate that half the production machinery of the United States has reached the replacement point in its progress toward complete obsolescence. In some industries, indeed, the forms of machines used are obsolete even though the machines themselves may be comparatively new. The equipment of the textile industry is typical. Except for some minor and a few major improvements, the machin-

the last being the figure for 1919 — a war-employment holdover, which fell the following year to 6.4.

An examination of the figures, then, reveals a surprisingly steady ratio of factory workers and all gainfully employed to the rapidly increasing population — until the period 1931 to date. To attempt an analysis of the causes of that depression period would require far more space than is here available. It is, moreover, unnecessary. Most intelligent people realize by this time that the depression was man-made, not machine made.

It is difficult, therefore, to perceive any real cogency in the unemployment arguments of the anti-machine forces. To clear the ground still further, however, there is a somewhat fatalistic argument to consider, namely: That things will never be the same again; in other words, that this period marks the end of an epoch. If that argument is valid, this day of ours would have to be the end of civilization. Now, it is as inconceivable that the appetites, wants and demands, created by the machine, should suddenly cease to exist as that a new cycle of



ery used in the average cotton mill has not changed a great deal in 50 years. The last drastic change was the substitution of the present rotary cards for the old-fashioned railroad cards more than half a century ago.

Machine Designers Have Been Busy

The replacement of the obsolete and obsolescent machines in all other industries has begun in a small way. It will go on at an increased pace as business picks up. Meanwhile, the machine designers have not been idle during the depression. Most of them have taken advantage of the opportunity to create new models and refine old ones. When these machines go to work they may well revolutionize cost and method in industry.

The other field of cost reduction by the machine is a large one, including nothing less than the total of human activities, not now aided or performed by machinery. One would think that its potentialities for mechanical application had been pretty well reduced by now and that there are few paying streaks left for the inventor. Let us see.

There is the building industry—one of the three largest—$6,000,000,000 a year at its highest. Buildings have changed a great deal, in some respects, since Babylon or Rome, but building methods have remained astonishingly primitive. We still use brick and lay them by hand; plaster and trowel it on coat by coat; paint and brush it on slowly and laboriously. We still order a lot of boards and measure, mark, cut, fit and nail them in place by hand. And so on throughout the building operation.

Courageous attempts have been made in the direction of mechanizing the construction of buildings. They have succeeded, despite the immense inertia of our building habits. A much greater measure of success may be expected when the attention of machine designers is focused more intensely upon the possibilities of the building industry.

A few years ago revolutionary

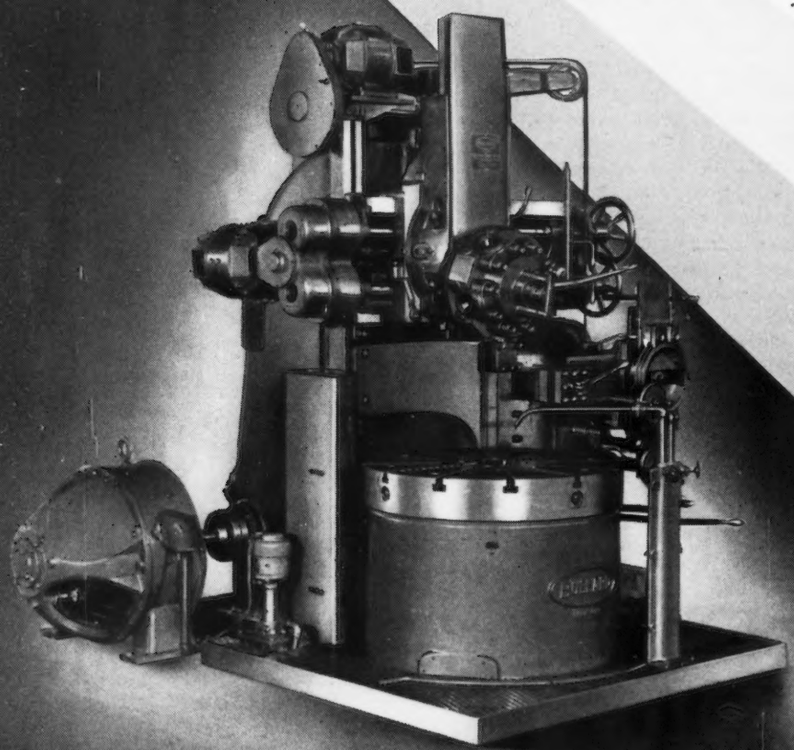
economies in agriculture on a large scale were made possible by collective farming with the aid of highly improved machinery owned in common by the operators of groups of farms. There is room for further mechanization of the planting, cultivation and harvesting of the immense acreage of the non-perishable grain and fiber crops. The machines, some of them still slumbering in the minds of their inventors, will be ready when the growers perfect their organization for raising and marketing their crops.

There is, moreover, a hitherto untouched field for the machine, in the working of perishable crops, vegetables and fruits. Even a casual observer, driving through the flat, truck-gardening acres around our great cities, must be impressed by the laborious methods of cultivation—the groups of men, women and children, toiling in the hot sun, plucking up weeds, removing insects, loosening up the soil or picking fruit and berries. Surely there must be some way of doing all these difficult chores mechanically. Inventive genius will doubtless find the answer to that

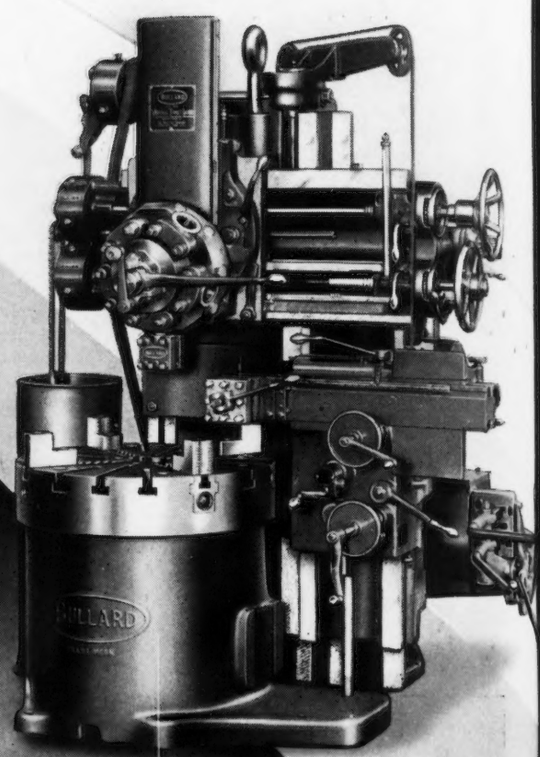
(CONTINUED ON PAGE 97)

VERTICAL *Turret* LATHES

BULLARD



HIGH SPEED
TYPE

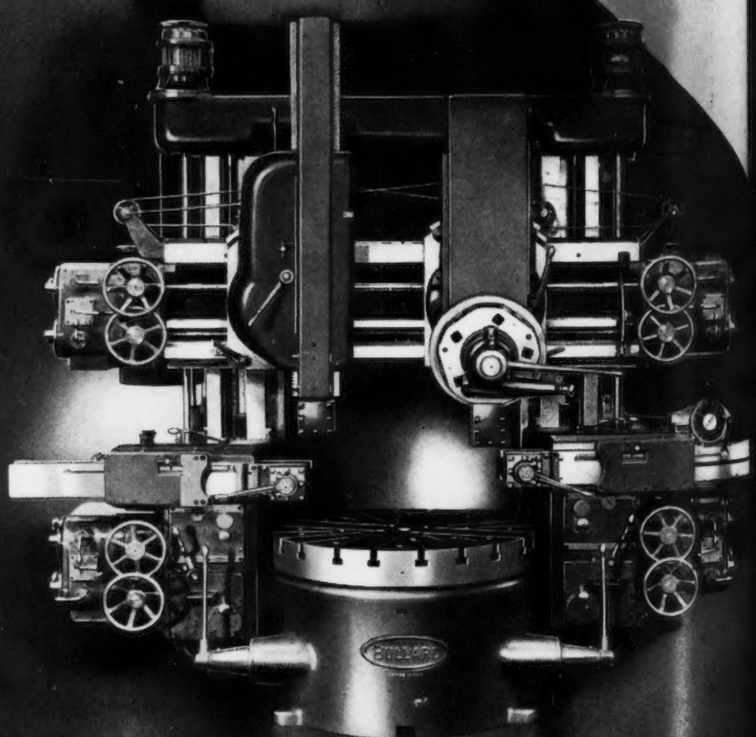


SPIRAL DRIVE
TYPE

Machines are Good Investments only insofar as they Save Time, Result in Manufacturing Efficiency, and are Productive of Profits.

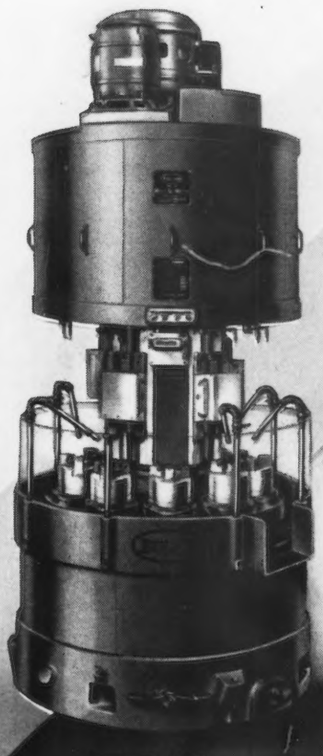
The Bullard Line of Vertical Turret Lathes offers these possibilities in your plant.

See them in operation at The Show, and come prepared to present your Problem Jobs.

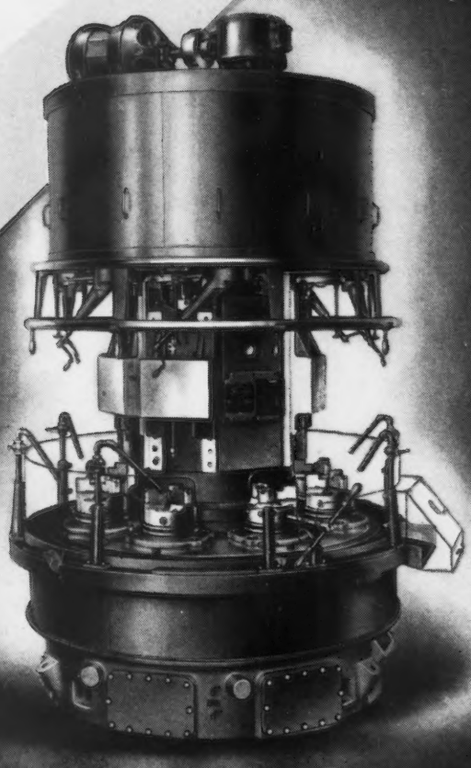


HYDRO-SHIFT

MULTIPLE *and* SINGLE SPINDLE AUTOMATICS



TYPE "J"
MULT-AU-MATIC



TYPE "D"
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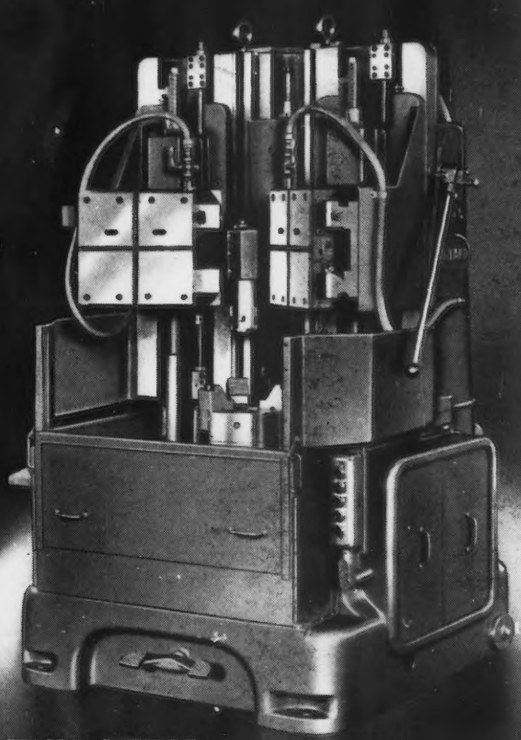

SINGLE SPINDLE
AUTOMATIC
LATHE

Requirements for Modern Automatics call for Low Cost reproduction of quantity lots in less time and to even closer limits than heretofore.

Ruggedness to withstand the higher speeds and heavier feeds as applied to the tougher materials of today's products is only one of many important features of Bullard Machine Design. See these manufacturing units at The Show.

A. M. WIBEL

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Appraising Machine Tool

THE author of this article, as is well known in the machine tool industry, is in charge of all purchases made by the Ford Motor Co. From $400,000,000 to $700,000,000 is spent annually under his direction, the purchases ranging from steel mills to insecticides, and of course including materials used in production.

In this article, Mr. Wibel gives an interesting and informative account of Ford policy and practice with regard to machine tool selection, replacement and operation. The company operates 42,000 tools in its various plants, including almost every known type and size. What the author relates is of interest to small as well as large users of machine tools.

MACHINE tools in Ford plants are highly considered and respected by the entire executive and production personnel of the company. They are so much a part of our scheme of things that we handle all phases of their procurement and use with unusual care.

In the manufacture of an automobile, approximately 15,000 parts are needed. Many of them are complicated and necessitate numerous machine tool operations. As purchased by us, machine tools are applied to a particular operation and theoretically located in the shop in advance of the actual receipt of the machine. The procedure of determining whether a machine tool should be bought and the kind that should be bought is worked out from a thorough study of each operation in connection with every one of the thousands of parts of a motor car.

One theme runs through our whole buying procedure, and that is that we try to secure the best tool possible for the particular work we have in mind.

Most any make of automobile today is a good, highly efficient piece of mechanism. This is due to the fact that years of effort and experience have been spent in its perfection. Necessarily, to follow American ideals machine tools must proceed toward perfection, just as the automobile, and we believe that they have. We are constantly looking for the type of machine tool which shows that its maker has added to its refinement and efficiency.

Twenty years ago machine tools were not adapted to requirements of the motor car manufacturer as they are today. At that time the user and maker of machine tools were confronted with the problem of how to design equipment so as to fit the special needs of automobile manufacturing. Machine tools built as special equipment in those days are more or less standard today; at least the principle of the machine is standard.

During the last six or seven years we feel that the machine tool maker has rightly directed his efforts at perfecting standards and types of equipment which already had been established. What we mean to say is that the need for a large number of special machines has been reduced because that phase of machine tool manufacturing for the automobile industry is passing.

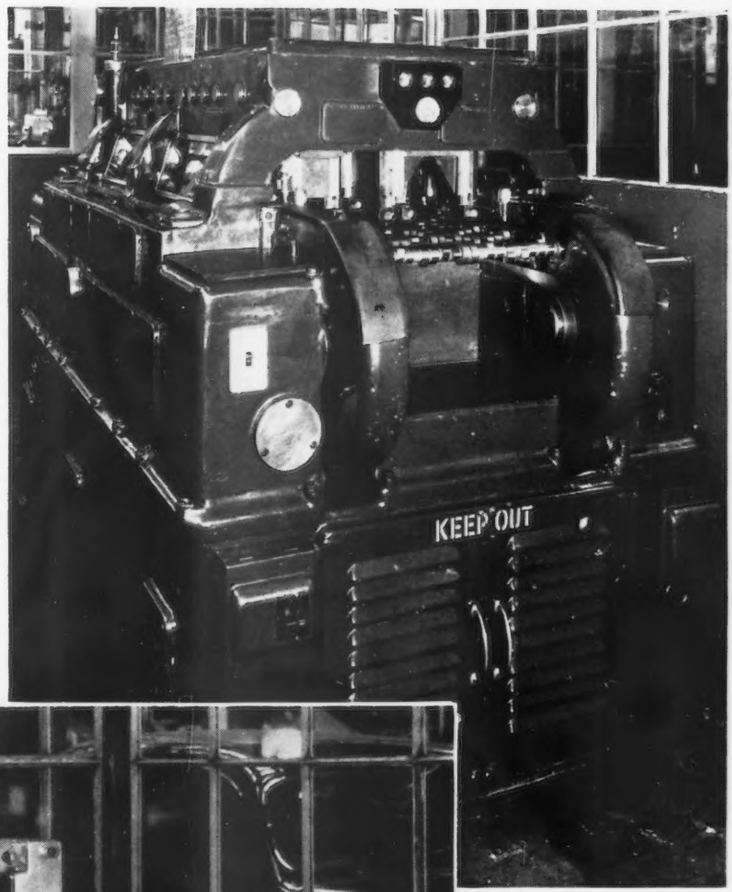
The Ford Motor Co. has built many special machine tools of its own, largely because the motor car industry grew so fast that it had to do this in order to adapt machine tool equipment to its needs. Not so much is being done along this line today, and we feel that this is as it should be. We are not machine tool builders. The splendid way in which the machine tool industry has met the requirements of the automobile industry has mostly eliminated the necessity for automobile companies to make their own tools.

With the idea of standardization and improvement in mind, machine tool builders have done much to enhance their equipment by the addition of standard anti-friction bearings, standard better types of gearing, better quality material, greater accessibility for repairs and better lubrication, and by a more pleasing appearance. We realize that machine tool manu-

Replacement Possibilities . . .

By A. M. WIBEL
The Ford Motor Co.

facturers always are confronted with the problem of trying to build a machine which will satisfy both the quantity producer and small operator. It seems to us that those things which we try to accomplish in quantity buying for our larger shops apply equally well to the needs of the small user. Efficient, up-to-date, safe, and good looking tools certainly have a place in any size machine tool shop. Great strides have been made toward the solution of this problem of adapting machine tools to the greatest number and variety of users. Many machine tools, as made today for the automobile trade, are really special, universal, and standard-special, in that originally they were designed for some special need; universal, because the



FORD has many machines of its own design and manufacture which cut minute costs and make more efficient testing and inspection of parts. Above is an automatic electric gage to check camshafts. This machine gages all bearings, the timing gear flange and oil pump gear pilot each to within ± 0.00025 in. It also gages the fuel pump eccentric diameter and the heel diameter on all cams to within ± 0.001 in. The Ford-designed machine at the left automatically checks piston pins as to surface, hardness, diameter of pin at two points.

HEALD

PRECISION *Grinding* MACHINES

AT THE CLEVELAND

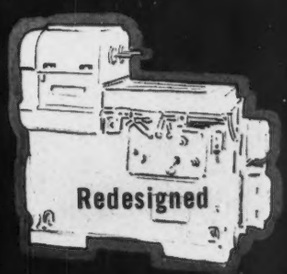
At Cleveland, we will exhibit 22 machines in actual operation on regular production work. Ten are brand new and have never been exhibited before. They include a Gap Internal for work needing large swing • An Internal for handling work larger than our standard No. 72's • Centerless Internal Grinding Machines • A Precision Boring Machine specially designed for facing and grooving • A Bore-Matic for

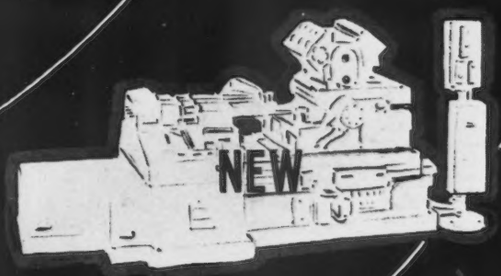
THE HEALD MACHINE COMPANY,

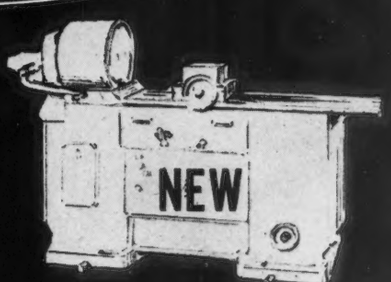
PRECISION *Boring* MACHINES

HEALD

SHOW, BOOTH 206

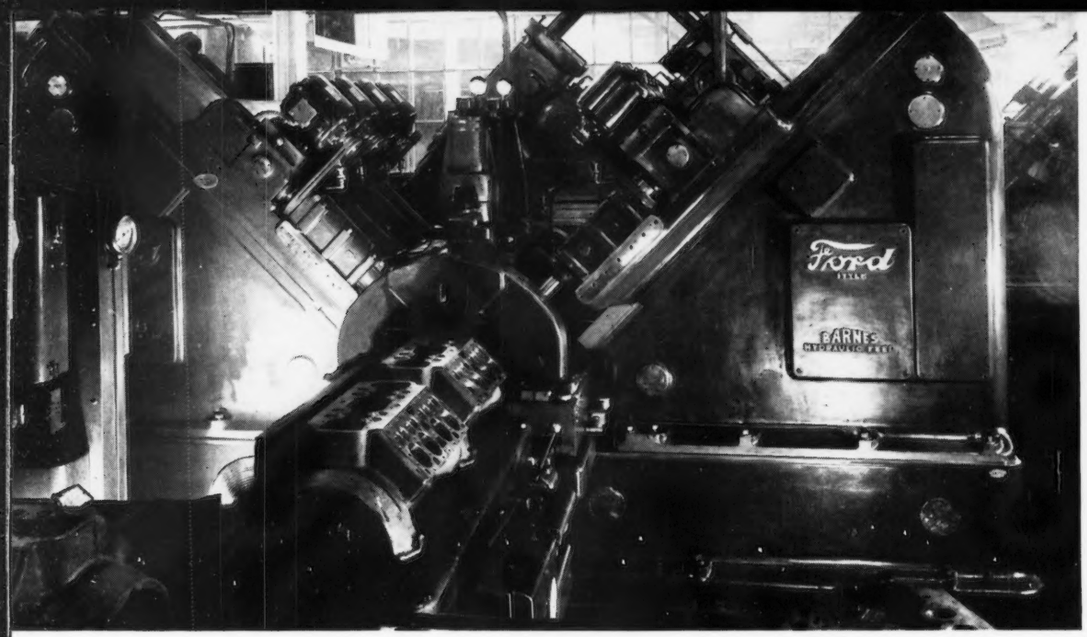






precision boring automobile cylinders and other large castings • A new small double-end Bore-Matic • Also a new single-end Bore-Matic for manufacturers with small production. Four of the 22 have been completely redesigned and much improved. The balance are proven products operating satisfactorily in hundreds of shops. See this outstanding exhibit, with many new products of the most modern design!

Worcester, Massachusetts, U. S. A.



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PROGRESS made in designing machine tools of more pleasing appearance is shown in these photographs. At the left is a newer type of machine for boring cylinder blocks.

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special features are used to fit the requirements of many users; and standard, for a great many builders have recognized this situation, and as a result such machines really become standard.

In purchasing new machine tool equipment, we do not have any set rule which we arbitrarily follow. That is, there is no saving in dollars or cents or in percentage which would determine when we should or should not buy a machine tool. It is impossible to establish a fixed formula because of the varying conditions surrounding the operations of machine tools. In some instances, the dominant factor in making an expenditure is the substantial savings which can be made. In other cases, equipment is purchased because the new type of machinery creates a better quality of product.

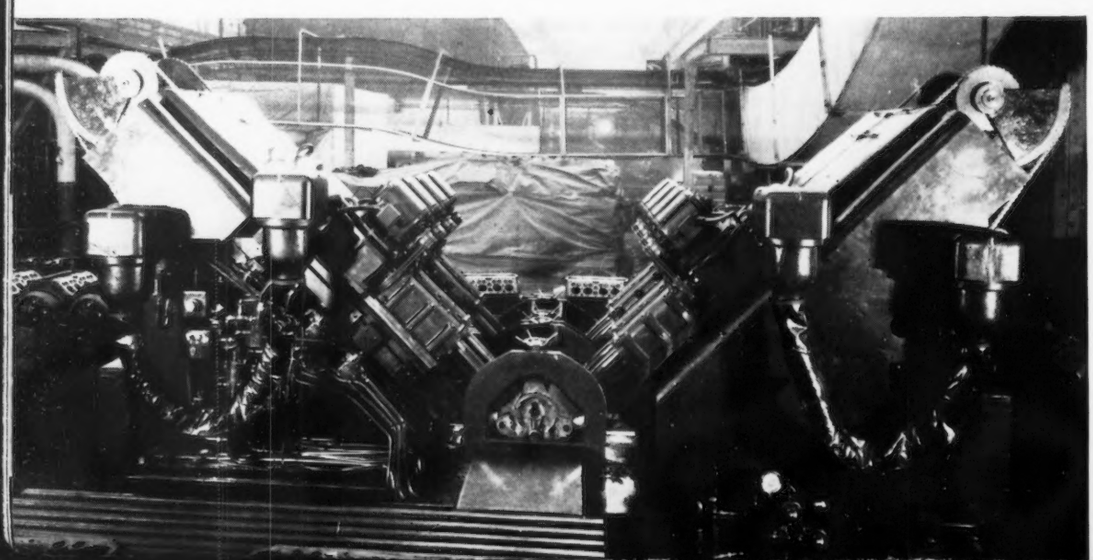
We must keep in mind, of course, that there are many changes annually in automobile design and therefore we like new equipment to pay for itself in the shortest possible time so as to prevent the part for which the machine is purchased from becoming obsolete before the machine cost has been amortized. The more universal adaptation of machine tools to many different operations has helped this situation.

To be successful, a machine tool within reason must operate continuously. Users cannot be constantly worried over the possibility of costly shutdowns. The breakage of cutting tools, lack of proper lubrication, inaccessibility for replacement of parts, proper arrangement of cutting lubricants and disposal of chips are sources of trouble which may make or break a machine tool. The automobile manufacturer has certain production schedules to meet. He may have thousands of tons of raw materials piling up. Hence he cannot afford to be hindered and harassed by a machine tool which does unsatisfactory work.

We feel that much stress should be laid on the thorough testing of complicated machine tools before the builder ships them to the user. Perhaps the shop and office of our machine tool suppliers are not always in accord with each other. No doubt many a shop superintendent has released shipments of tools before they were ready because of office pressure. The Ford Motor Co. cooperates where necessary by seeing that an adequate supply of unfinished automotive parts is shipped to the machine tool maker for the purpose of making tests and adjusting the machine tool before it is set up in our production lines. This policy results in savings both to us and to the machine tool maker.

Trial Orders

In connection with new types of machine tools which have not yet proved themselves in production, we place what is termed a trial, or a guaranteed production order. That is, the equipment builder makes certain claims for a new machine. We often agree to let him prove his claims, so far as our own requirements are concerned, by installing the machine in our plant under our own working conditions and actually operating it in our productive lines for a short time.



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CONTRAST above with older type of machine at the left, which has unsightly brackets and mountings.

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Should the machine turn out to be satisfactory for our work, we equip for our entire production. If its performance falls short, it is returned to the maker. Incidentally, before we make an installation of this kind, we feel reasonably certain that it will be satisfactory; otherwise the expense involved and the cluttering of the machine shop during the tryout periods would be too great an obstacle.

Machine tools must be made so as to perform satisfactorily when operated by the average worker. They can be built so complicated that only an expert can make them work efficiently. Such machines are impracticable where a large body of workmen is used.

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THE automobile industry is far in advance of State laws in protecting the worker against accidents. The operator of this press must have both hands on the control buttons and his foot on the pedal before the machine will work.

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o o o

MOTOR drives can be incorporated in the design of machine tools so that the beauty of the machine itself is not marred.

o o o

Why Not Design for Lightness?

Automobile builders and airplane manufacturers have spent much time and thought in the last few years on attempts to reduce the weight in their products. It is obvious that they have accomplished much along this line. Why don't machine tool makers turn their attention more toward decreasing weight of their equipment where it will do the most good? We are of the opinion that the machine tool designer must constantly have in mind the thought, "How can I design this machine tool to perform the work and still build it as light as possible?" To accomplish this objective, he will naturally think of lighter and bet-

(CONTINUED ON PAGE 120)

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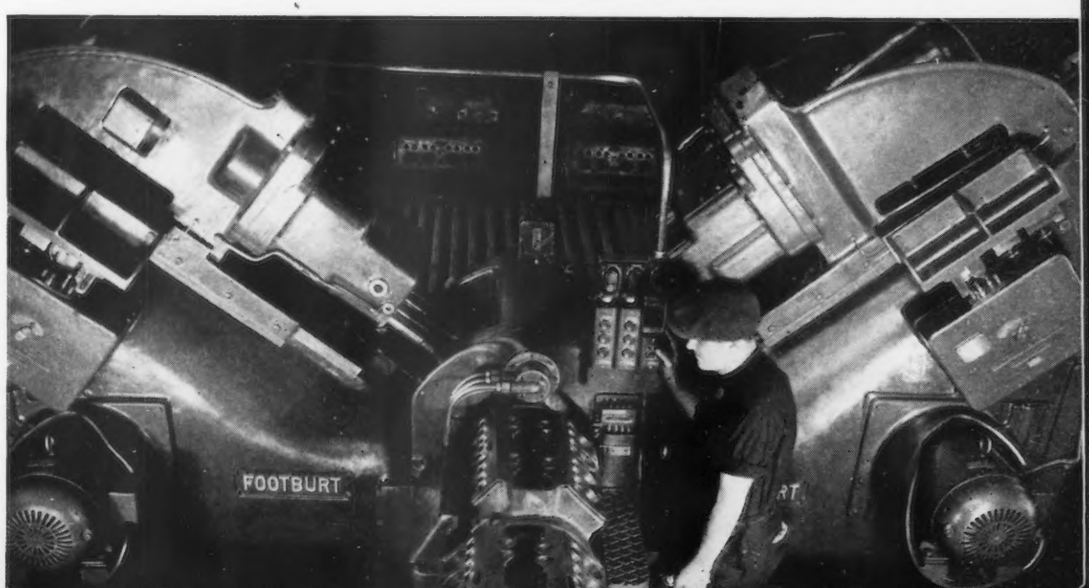
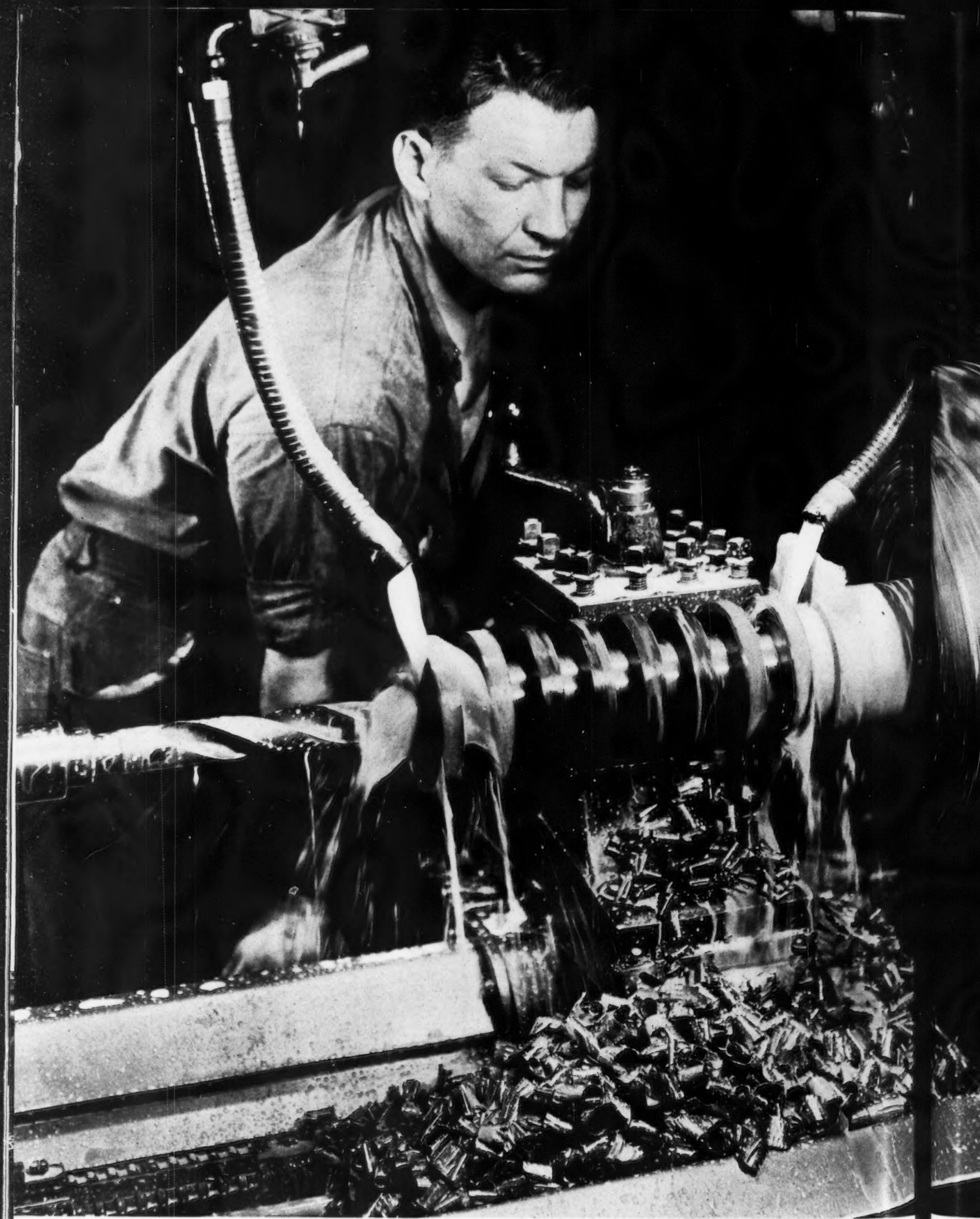
ELECTRICAL apparatus has helped materially in the safe operation of machine tools. This machine, for example, is operated through its entire cycle by means of push buttons pressed by the operator. The machine is used to drill valve holes in cylinder blocks.

o o o





A three million dollar demonstration

. . . JUST FOR YOU

● Demonstrations of every conceivable nature . . . familiar scenes like these will greet you on every side. Startling new designs . . . higher cutting speeds . . . worlds of power . . . and accuracies on everyday jobs that were unheard of a few years ago. All planned to show you the rapid forward strides taken by machine tool builders these last few years. » » And to demonstrate to you that your present methods of operating can be improved . . . and your costs lowered, by using modern machine tools. » » So don't fail to come to Cleveland to the Machine Tool Show, September 11th to 21st. It will pay you big dividends. » » Remember our booth number . . 905. We shall be expecting you.

THE WARNER & SWASEY COMPANY
CLEVELAND, OHIO

Keeping an Eye on Your

MR. DANEKIND joined the General Electric organization in 1924 as efficiency man in the superintendent's office at the Schenectady works. He continued in that capacity until 1929, when he was transferred to the Works Laboratory where his duties were concerned with the specifications, tests, development, and process control of non-durable materials. In 1933 he entered the Manufacturing General Department of the company where he is at present, his chief activities centering on machine tools and processing. He has been chairman of the factory equipment and practice committee for more than a year and a half. Mr. Danekind was born in 1896 in Meriden, Conn., and attended Middlebury College and Purdue University, where he studied mechanical engineering.

o o o

MACHINE tools and other shop equipment represent fixed capital investment, return from which is directly proportional to rate of output and cost per unit produced.

Every machine requires human attendance and service in greater or less degree. Material to be machined, cutting tools, jigs and fixtures and necessary equipment of non-durable and miscellaneous shop supplies must be provided. An operator must be assigned to it, proper working conditions established, and arrangements made to bring work pieces to the machine and take finished pieces and waste materials away. Thus the planning for maximum results involves consideration of both man and machine, and of their surroundings.

Keeping an eye on your equipment investment, giving your machines a "break," then, calls for consideration of the department layout and advisable methods of servicing machines. It also calls for consideration of the effectiveness of the operator, cutting tools, supervisory personnel, planning and scheduling, manufacturing methods, control over maintenance, control of overhead variables, etc.

With approximately 25,000 machine tools in its plants, the General Electric Co. may be said to be a very large user of such equipment. The various works of the company comprise a number of self-contained plants, each with its own works manager and assistants. Various divisions differ in type of manufacturing activity from mass or continuous types, as in the manufacture of refrigerators, fractional horsepower motors, meters, etc., to shops of intermittent production or jobbing type, as in the building of large turbines, generators, transformers, oil circuit-breakers, etc. Hence, our experience as a machine tool user may be said to include practically all types and sizes of tools.

Securing maximum return on the investment in 25,000 or more machine tools calls for extensive planning of details—a problem of considerable magnitude. Some of our procedures in this connection—as many as space will permit—are outlined in this article.

HOWEVER highly developed, machine tools are not to be thought of as complete in themselves, but as part of a manufacturing system. They are "tools," and their maximum effectiveness depends upon many details beyond the sphere and control of the machine designer. Department layout, servicing of machines, good lighting, safe operation, adequate lubrication and many other factors directly affect production and, therefore, return on the machine investment. Practices of a company notable for progressiveness in its use as well as in selection and replacement of manufacturing equipment are outlined in this article.

Single- Vs. General-Purpose Equipment

Manufacturing activities of the great majority of General Electric departments comprise for the most part short orders of a job-shop character. In selecting new machine tools to meet this condition, our preferences are decidedly toward conventional general-purpose equipment. Of course, in those departments where manufacturing activities are of the continuous or high production type, we have very definite justification for operating a considerable number of single-purpose or special machines. A high grade standard unit, however, embodying a wide speed and feed range and favorable accessibility of control—providing, as it does, a broad degree of flexibility—meets the greater portion of our requirements best. Work-holding fixtures on the other hand are designed and constructed as a single-purpose accessory. We go to extreme detail in this regard, giving consideration to every mechanical, hydraulic or pneumatic principle at our command, in an effort to obtain the ultimate from a labor-saving standpoint. This combination—a flexible general-purpose machine equipped with adequate single-purpose fixtures might be said to be our broad general policy covering machine

Equipment Investment

By A. C. DANEKIND

Chairman Factory Equipment and Practice Committee, General Electric Co., Schenectady, N. Y.

Giving Machine Tools a "Break"

tool equipment for most of our requirements.

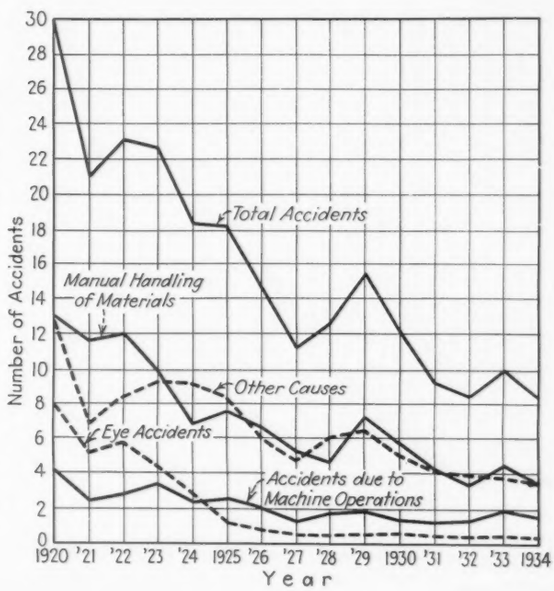
Internal Transfers and Replacements

During the past few years, with business at a subnormal level, the utilization of any number of our machine tools has not been particularly high. As a result of this condition the General Electric Co. has adopted a policy of transferring idle equipment from the production floor of any department which might be operating at a particularly low percentage of capacity, to any other department of the entire company where additional capacity might be needed. The conditions governing such transactions make it mandatory that no transfers are to be made unless the equipment is entirely capable of meeting its new requirements. During the past few years hundreds of machines have been redistributed which are now earning a fair return on the invested capital through more normal utilization, and thousands of dollars of additional investment have been found unnecessary during a period of subnormal business.

We have experienced conditions whereby a considerable number of up-to-date machines have become idle due to a radical change in design of parts to be produced for a particular line of product. In such cases we have transferred this surplus equipment to other works for the sole purpose of replacing older units. Any part of the surplus

AT RIGHT

FIG. 2—Lost time accidents per million man-hours. Graphic testimony to the effectiveness of safety activities, in the various plants of the General Electric Co.



BELOW

FIG. 3—Improved lighting in this tabulating machine room increased production 30 per cent, and reduced errors by about one-half.

AT CLEVELAND

10 NORTON MACHINES IN ACTION

MACHINE TOOL SHOW SEPT. 11-21 1935

Three Type C Cylindrical Grinders

A 6″ Semi-automatic, a 6″ Hydraulic Traverse and a 10″ Hydraulic Traverse. . . . All with spindles end-driven by multiple vee belts from motors mounted on wheel slides. . . . All with forced-feed lubricated ways. . . . All with flood lubricated spindle bearings.

Two Automotive Grinders

A crankpin grinder—the D-86, and a cam contour grinder—the Cam-O-Matic. . . Both have forced-feed lubricated ways and flood lubricated spindles end-driven by multiple vee belts from motors mounted on their wheel-slides. Two high production grinders designed especially for the automotive industry.

Two Universal Tool and Cutter Grinders

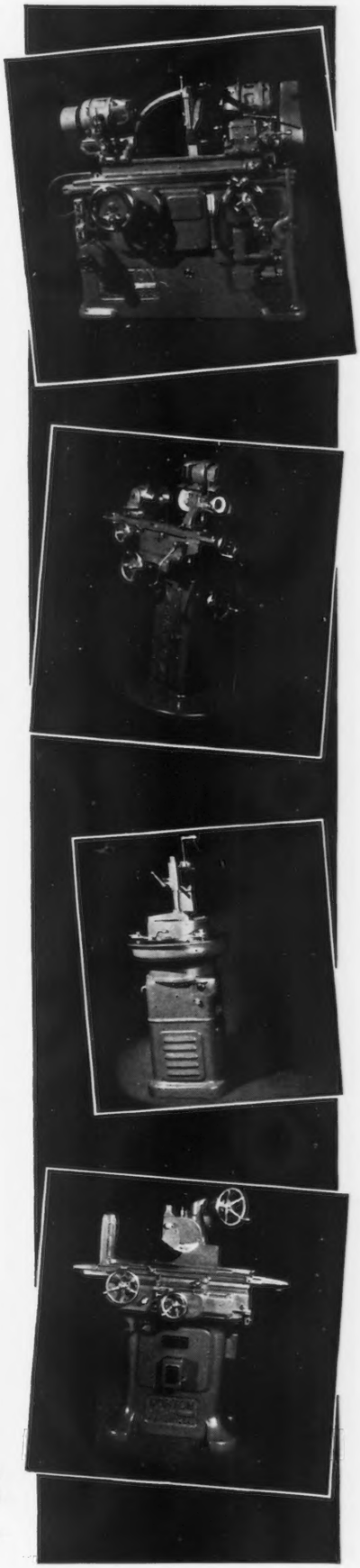
A No. 1 with 10″ swing and a No. 2 with 12″ swing, the latter having hydraulically operated table traverse. . . . Both have cartridge type wheel spindles and a wide variety of optional equipment for accommodating the many diversified jobs in the modern tool room.

Two Lapping Machines

A No. 10-U with cast iron laps for both cylindrical and flat work and which uses abrasive flour mixed with a suitable vehicle. . . . A No. 24 or HYPROLAP for either flat or cylindrical work; uses bonded abrasive laps and is hydraulically operated.

A Small Surface Grinder

Hydraulically operated with cartridge type wheel spindle, automatic cross-feed and equipped for wet grinding. . . . On this machine will be shown the grinding of cemented tungsten-carbide using Norton Diamond Wheels. . . . This machine can be arranged for dry grinding or with integral motor spindle if desired.



NORTON
GRINDING & LAPPING
MACHINES

NORTON COMPANY, WORCESTER, MASS.
New York Chicago Detroit Cleveland
Hartford London

M-343

which cannot be properly utilized in this way is placed in "idle plant" and held for future use. Regarding sale of used idle equipment to outside vendors, no piece of machinery is sold which is in a sufficiently good mechanical condition to be used in our own manufacturing departments.

Replacement as a Result of "Technical Obsolescence"

"Technical obsolescence" may be defined as a condition whereby the development of a more efficient design of machine makes it relatively expensive to operate the older unit, even though its actual age is a matter of but a few years and its mechanical condition sound. Because of the necessity to achieve lowest possible unit costs, regardless of the nature of work being done, we watch for every possible advantage through new and substantially more efficient equipment. We regard it as extremely important to keep thoroughly informed on new machine and small tool developments. Our interest in replacement as a result of technical obsolescence is such that we are extremely appreciative of advice of machine tool builders who explain to us the capabilities of their new developments as compared to those of the superseded models. We are always anxious to cooperate in the development of genuinely advanced new designs and have in many cases purchased and installed in our plants the first units of new developments.

Replacement as a result of technical obsolescence requires much thought. The older machine may have been in operation but a few years, which means that the financial reserve against eventual replacement has been built up to but a small portion of the original cost of the machine.

One factor of a varying character must first be determined—the extent of utilization of the new machine. This prediction must be based on past statistics and future anticipation rather than on known facts, for no one can accurately prophesy the volume of business we might enjoy two or possibly three years hence. In view of the lack of more positive information we assume present volume of production as normal insofar as anticipated future utilization is concerned. If, under such conditions, we are able to liquidate the cost of a new machine over a period of 2 to 2½ years (depending on stability of line of apparatus) we consider its purchase a good investment regardless of the book value of machine being replaced. The basis of liquidation is the composite savings obtainable through (1) lower direct labor, (2) reduction in spoilage, and (3) reduced maintenance expense.

During the past few years we have made a considerable number of machine tool replacements in conformance with conditions as outlined. We are very receptive to suggestions of machine tool builders which might result in justification of additional replacements.

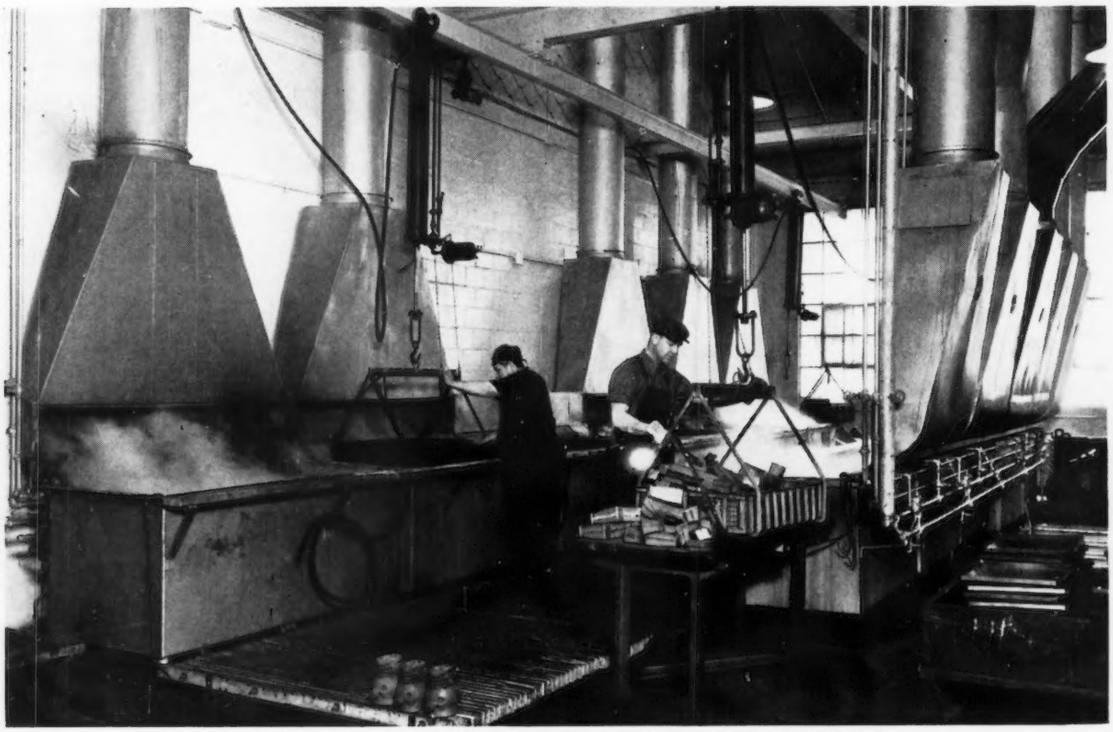


FIG. 5—Light-colored ceilings and walls have an important effect on general illumination as well as on appearance. Note, too, in this pickling room, the general cleanliness and systematic arrangement of facilities.

Replacement Due to Normal Causes

Our records indicate that approximately 60 per cent of the machine tools and other types of manufacturing equipment in our plants is over ten years old. This compares quite favorably with sta-

tistics recently published as a result of a nation-wide survey of most basic industries. We do not recognize a ten-year age period as measuring the useful life of a machine for obvious reasons. As a matter of fact, a considerable number of our larger units have been fully depreciated and are still economical to operate. Planers, boring mills, slotters, drilling machines, engine lathes, etc., are commonly used in departments producing short orders of a job-shop character, and may justly be considered as "long-lived" equipment.

While we recognize that ultra-modern equipment of this general class has been developed to a standard of efficiency far beyond that of our older machines, ample physical capacity in equipment is of primary importance in the operation of many of our departments. Extent of utilization is usually intermittent and direct labor savings which might be realized through more modern equipment is but an insignificant portion of replacement cost.

Any piece of machinery will eventually become uneconomical to operate as a result of the normal effects of continued use. As breakdowns become more serious in character and occur at all too frequent intervals, maintenance expenditures rise beyond a point of reasonable justification.

"Mechanical soundness" is a necessary requirement in any piece of machinery and, when our older equipment can no longer qualify in this respect, replacements are made —with age of machine, and labor savings which might be realized, considered as of secondary importance.

FIG. 1—The wisdom of protecting workers' eyes with goggles is dramatically emphasized by this picture showing how one employee's sight was saved in a solder-pot metal splash.

Maintenance of Manufacturing Equipment

Maintenance of all kinds is an expense item which must be absorbed in costs. Such expenditures represent very substantial sums in large industrial concerns. Maintenance may be divided into two general groups: (1) regularly recurring expense, which is more or less fixed regardless of volume of production, and (2) expense which varies with degree of utilization of manufacturing equipment. Investments in real property (buildings, grounds, roadway, etc.), require periodic repair regardless of volume of business, while operation of manufacturing equipment necessitates expenditures in greater or less degree, due to three fundamental causes—severity of service, age (as it affects mechanical condition) and extent of utilization (volume of production).

A budget is prepared for each department of our plants providing fixed allowances plus an amount which varies with the direct labor load. Regarding the variable portion, the volume and effectiveness

(CONTINUED ON PAGE 157)

FIG. 4—Where especially high levels of illumination are necessary, the desired result can usually be obtained most economically by supplementing the general illumination with spot-type units, as in this case.

FOUNDED SELLERS 1848

SELLERS

FOR THE NEW

At the Show . . Booth No .401

SELLERS MACHINE TOOLS — Planer Type Milling Machines . . . Double Housing and Openside Planers . . . Plate Planing Machines . . . Vertical Boring and Turning Mills . . . Horizontal Boring, Drilling and Milling Machines (Table Type, Floor Type and Planer Table Type) . . . Special Machinery . . . Drill Grinders . . . Tool Grinders

WILLIAM SELLERS & CO., INCORPORATED

S MACHINE TOOLS

V PRODUCTION ERA

Write for New Complete Catalog

SELLERS RAILROAD SHOP TOOLS—Car Wheel Lathes . . . Driving Wheel Lathes . . . Car Wheel Boring Machines . . . Driving Box Boring Machines . . . Locomotive Tire Boring and Turning Mills . . . Locomotive Frame Slotters . . . Locomotive Cylinder Boring and Facing Machines . . . Air Brake Cylinder Boring Machines

1630 Hamilton Street . . . . . PHILADELPHIA

C. S. THOMPSON

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Why Pay for Modernization

"WHEN you operate obsolete equipment, you pay for modernization without getting it. Modern, high speed machines pay for themselves." This statement appears on the letterhead of the Union Special Machine Co., Chicago, manufacturers of industrial sewing machines. It is, in fact, the guide used by this company not only in its sales efforts but also as the measure of equipment used in its manufacturing plant. In order not to place the cart before the horse it is only fair to say that the idea of a real measuring stick originated in the shop and its advantages being quickly appreciated the sales department adopted the idea and has been using it with great effect.

The problems that confronted the management were typical of any manufacturing plant where quality is the byword. In the first place precision must be maintained. Machine tool equipment must be in balance to insure parts flowing as needed through the shop. Each machine must earn its way and new and better ways must be found in order to take advantage of lower cost and improved methods.

The plan of a perpetual inventory of machine tools and their performance now in use by the Union Special Machine Co. was started in 1929 when a close study was made of each piece of equipment. All findings were noted on a shop equipment record. Each machine was studied as to general condition, kind of drive, adaptability for motor drive, per cent of time the tool was in operation, quality of work produced, date of purchase, cost, inventory value and repair cost to date.

Four general classifications were

Machine
Make
Type
Inv. No. Ser. No.

SHOP EQUIPMENT RECORD Dept. No.

* ☐ Class A— ☐ Class C—
☐ Class B— ☐ Class D—

Date of Survey	General Condition of M.T	Kind of Drive	Adaptable for Motor Drive?	Location of M.T. in Dept. O.K.	No. of M.T. of This Type in Dept.	% of Time M.T. Is in Operation Per Annum	Quality of Work Produced	Date of Purchase	Purchase Cost	Inventory Value	Repair Cost From Jan. 1930 to Date

Class of Work Machine is Used For—
Is This a Special Purpose Machine?—
Special Fixtures Used on Machine—
Other Machines Fixtures Can Be Used On—
Tool Alteration Cost—
Type of New Machine Recommended—
New Machine To Be ☐ Replacement or ☐ Addition.
Tooling Cost For New Type Machine—
Repair Cost to Put This M.T. in Good Condition—
Electrical Equipment:—

REMARKS:

(Note: Date & Initial All Remarks.) —Over—

*NOTE

Class A

Denoting machine tool equipment which, for adequate reasons, should be replaced with a better machine tool.

Class B

Same as "A" except that urgency for replacement is not so great.

Class C

Covers equipment where specific recommendation is made as desirable after recommendations for "A" and "B" have been carried out.

Class D

Denotes that equipment now in use is found to be the best obtainable for our particular use.

Form 377

o o o

THIS shop equipment card affords a complete record of a machine, its operation and its classification as to effective usefulness

Unless You Profit From It?

By C. S. THOMPSON
Chief Engineer, Union Special Machine Co., Chicago

MACHINE tool users, and builders too, can take a leaf, profitably, out of the book of experience of the Union Special Machine Co. of Chicago. This company knows what its production machines are doing and how they fare in health and the system has worked so well in the plant that it has been extended to their product in customers' plants.

The author gives us a wealth of practical information in this article and the practice portrayed is simple but effective.

set up. "A" denotes machine tool equipment which, for adequate reasons, should be replaced with a better machine tool. "B" same as "A" except that urgency for replacement is not so great. "C" covers equipment where specific recommendation is made as desirable after recommendations "A" and "B" have been carried out. And, "D" denotes that equipment in use and which is the best obtainable for the shop's particular use.

Study was also made of the class of work for which the machine was used, and special attention was given to tooling and fixtures. For instance it was desirable to know whether or not special fixtures

AT RIGHT

ON the back side of the shop equipment card is this record of repairs.

BELOW

SPECIAL shop order and cost tickets can be issued if a repair job requires 9 hr. or less of labor.

RECORD OF REPAIRS-H-9300

SINCE JANUARY 1, 1930

Date	Labor Hrs.	Labor Cost	Material or Parts	Repairs Made On.

Machine: A B C D E F G H J K L M N P R S T U V

SPECIAL SHOP ORDER AND COST TICKET

PREVIOUS ORDER	TO BE MARKED	DATE	ORDER NO.
			19960

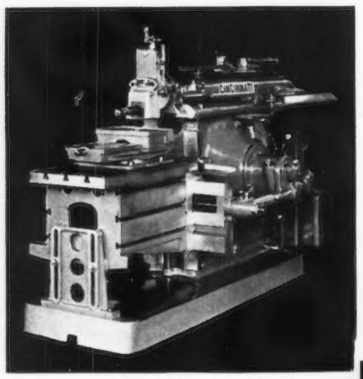
DEPT PLEASE MAKE

DELIVER TO FOR DEPT. AUTHORIZED BY

DATE	CHECK NO	NAME	OPERATION	TIME HRS.	TIME 10TH	RATE	AMOUNT	

ORDER COMPLETED O. K'D BY

Form 3



The speed, accuracy, and refinement of

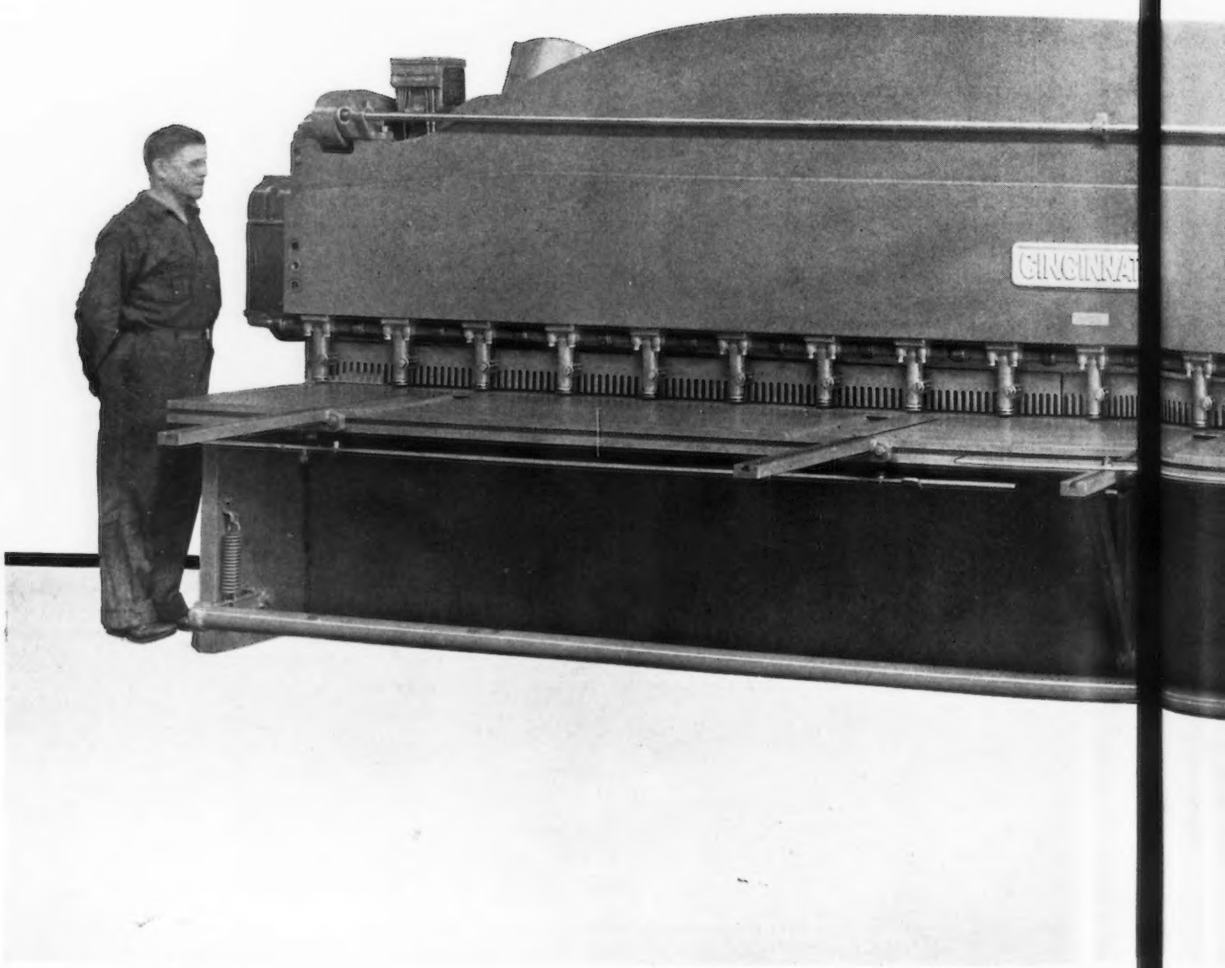
Cincinnati Rapid Traverse Shapers

COUPLED WITH

The strength, rigidity, and capacity

of Cincinnati All-Steel

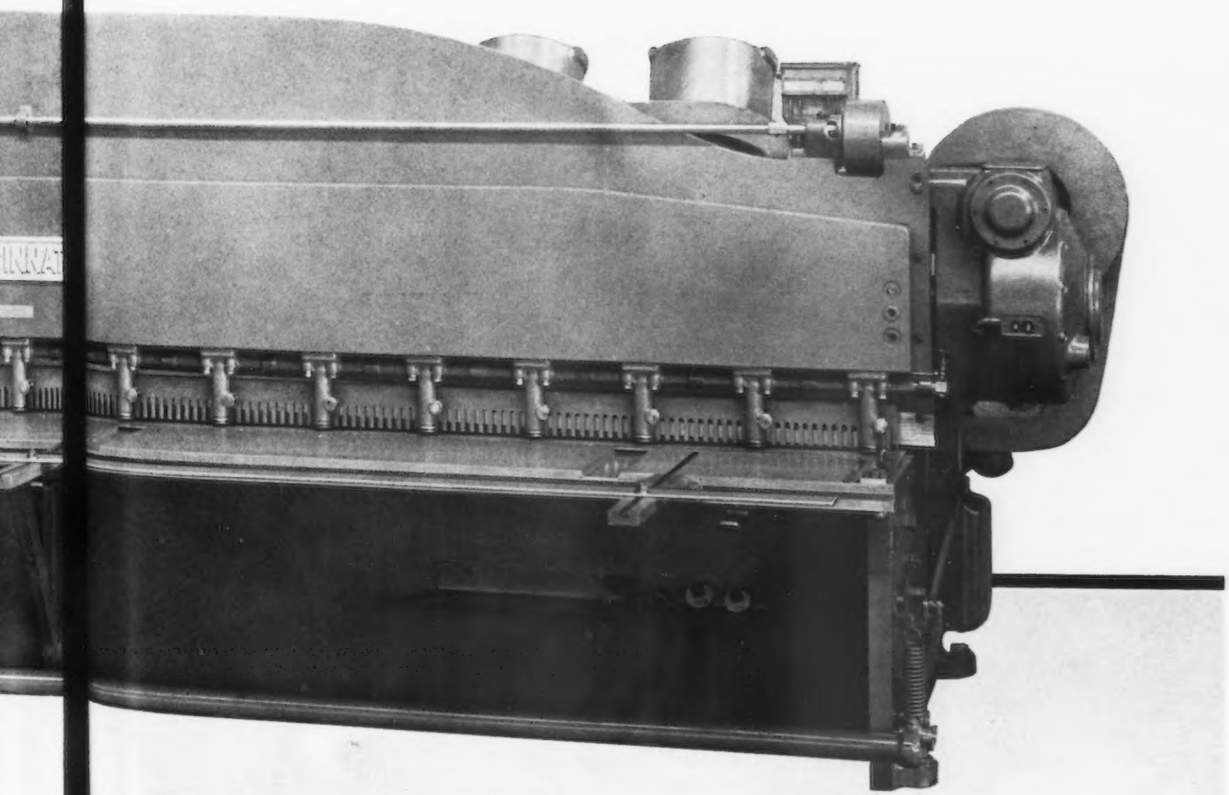
Press Brakes



are built into this new All-Steel Shear to make it as modern as the times. The Cincinnati is a precision Shear.

All three of these machines are offered as money makers for the modern plant.

THE CINCINNATI SHAPER COMPANY
CINCINNATI, OHIO, U. S. A.



MATERIAL USED					COST SUMMARY								
DATE	AMOUNT			ARTICLE		HOURS	RATE	ORDER TOTALS		REDUCTION FOR SPOILAGE		TOTAL COSTS	
	PIECES	LBS	OZ.										
					RAW MAT'L & SUPPLIES								
					RSEM MACHINES								
					ADJ. & PKD. MACHINES								
					SEMI FIN. STOCK								
					PARTS								
					INSPECTION								
					LABOR								
					FACTORY OVERHEAD								
					TOTAL								
					DR. ACCT. NO					DR. ACCT. NO.			
					$					$			
					DR. ACCT. NO					DR. ACCT. NO			
					$					$			

MATERIALS used and cost summary are entered on the back side of the form shown at bottom of page 43.

o o o

were used, if fixtures from other machines could be used on the machine in mind, and the cost of tool alterations if such changes would improve the usefulness of the machine. Newly acquired machines were also studied to determine whether they should be replaced or added to and what would be the cost of tooling a new type of machine.

Careful analysis was made to determine the repair cost of putting a machine tool in good condition. On the reverse side of the shop equipment record is space for listing cost of labor and parts used for repairs. In making this record sufficient detail is given so that future review of this repair record will reveal weak points in a machine. This furnishes not only a means of strengthening a machine part but also it is a guide to the future purchase of machines from the original or other machine tool manufacturers. Weak points are known and the manufacturer's designs are carefully checked to make certain that necessary improvements have been incorporated on the new machines offered.

A carefully planned system is used in order to have an accurate record of repairs. When a machine is in need of repairs a repair request card is issued. If the work will require nine labor hours or less a special shop order (or soft order) and cost ticket are issued by the department foreman to the maintenance foreman who without further authority may then do the necessary work. If, however, the expense is above this 9-hr. limit then a so-called hard order is issued, but only over the signature of the chief engineer, the superintendent and the factory manager. This hard order is officially designated as a master change request

CHANGE REQUEST No. | DATE | **MASTER CHANGE REQUEST** | PART No.

PART NAME

REQUESTED BY

ORDER No.	FOR DEPT.	DRAWING No.	DATE NEEDED
WORK TO BE DONE BY	DELIVER TO DEPT.	CLASSIFICATION	ESTIMATED COST

AUTHORIZED BY
CHIEF ENG.
SUPT.
FACT. MGR.

Form 97

o o o

FOR the heavier repair jobs a master change request must be issued.

AT RIGHT

THESE machine record cards are furnished at small cost to users of sewing machines.

MACHINE REPAIR RECORD CARD — INV. SYMBOL

MAKER'S NAME	MAKER'S SYMBOL	NEEDLES EMPLOYED	SERIAL NUMBER	DATE OF PURCHASE

DATE	MECH'S NO	LABOR COST	PARTS COST	TOTAL COST	SERVICE DAYS	REMARKS

OPERATION_____

MACH. MFD. BY_____

TYPE_____ SERIAL NO_____

MACHINE EQUIPMENT RECORD

SERIAL NOS OF DUPLICATE MACHINES INVOLVED

_____ _____ _____ _____

_____ _____ _____ _____

_____ _____ _____ _____

DATE OF SURVEY	YEAR OF PURCHASE	% EFFICIENCY COMPARED TO NEW TYPE	GENERAL CONDITION OF MACHINE: GOOD, FAIR, POOR	QUALITY OF WORK: EXCELLENT, GOOD FAIR	TYPE OF NEW MACHINE	COST OF CHANGE-OVER, IF NECESSARY	COST OF REPAIRS, IF NECESSARY	COST OF OVERHAULING, IF NECESSARY

☐ CLASS "A"—DENOTES MACHINE EQUIPMENT WHICH FOR ADEQUATE REASONS SHOULD BE REPLACED WITH A BETTER MACHINE

☐ CLASS "B"—SAME AS "A" EXCEPT THAT URGENCY FOR REPLACEMENT IS NOT SO GREAT

☐ CLASS "C"—COVERS EQUIPMENT WHERE SPECIFIC RECOMMENDATION FOR REPLACEMENT SHOULD BE MADE AFTER CLASS "A" AND "B" MACHINES ARE REPLACED

☐ CLASS "D"—DENOTES THAT EQUIPMENT NOW IN USE IS FOUND TO BE BEST OBTAINABLE FOR OUR PARTICULAR WORK

DATA ON VARIOUS NEW EQUIPMENT UNDER CONSIDERATION

TYPE AND MAKE OF MACHINE	DATA

CHINE CO FORM NO 233 PRINTED IN U.S.A.

Form 374 Copyrighted 1935 Union Special Machine C

AT LEFT

THIS form is used by the sales department to aid sewing machine users to understand the condition and economics of their equipment. Form 374.

GENERAL DATA		REMARKS
A. % INCREASE IN PRODUCTION DUE TO NEW MACHINES.		
B. AVG. DAILY WAGE ÷ AVG. DAILY PRODUCTION WITH PRESENT MACHINE		
C. AVG. DAILY WAGE ÷ AVG. DAILY PRODUCTION WITH NEW MACHINE		
D. NO. IMPROVED TYPE REQUIRED: (100 × NO. PRESENT MACHINES) ÷ (100 + ITEM A)		
SAVINGS EFFECTED		
E. SAVING IN FLOOR SPACE: (NO. PRESENT MACHINES — ITEM D) × (____ SQ. FT.) × (COST PER SQ. FT.)		
F SAVING IN MAINTENANCE: (NO. PRESENT MACHINES × YEARLY MAINT. COST) — (ITEM D × YR. MAINT. COST) .		
G. SAVING IN LABOR COST: (ITEM B—ITEM C) × (AVG. DAILY PROD.) × (NO. OPERATING DAYS PER YEAR)		
H. SAVING IN POWER: (NO. PRESENT MACHINES — ITEM D) × (1.5 KW HR.) × (COST PER KW HR.) × (NO. OPERATING DAYS PER YR.)		
I. SAVING IN THREAD COST: (PRESENT THREAD COST PER DOZ. — PROPOSED THREAD COST PER DOZ.) × (AVG. DAILY PRODUCTION) × (NO. OPERATING DAYS PER YEAR)		
J. TOTAL YEARLY SAVINGS: (ITEMS E+F+G+H+I)		
COMPUTATION OF REPLACEMENT COST		
K. COST OF IMPROVED MACHINE		
L. RESALE OR TRADE-IN VALUE		
M. COST OF CHANGEOVER, REPAIRS OR OVERHAULING NECESSARY ON PRESENT MACHINE		
N. NET COST ALL MACHINES: (ITEM K — ITEM L) × (ITEM D) — (ITEM M) × (NO. PRESENT MACHINES)		
O. NO. OPERATING DAYS REQUIRED TO REPAY NET COST: (ITEM N) ÷ (ITEM J) × (NO. OPERATING DAYS PER YEAR)		
P. ANNUAL RETURN ON NET COST: (ITEM J) ÷ (ITEM N) × 100		

AT RIGHT

THE Union Special Machine Co. offers all reasonable assistance to sewing machine users in computing savings and replacement costs as called for on this form.

on which all important data are listed.

Both soft and hard orders, when completed, are sent to the engineering department, where the data are recorded on machine repair record cards. These cards afford the engineering department a record and they form the source of information from which is filled in the reverse or repair record side of the shop equipment record.

Since the original survey in 1929 it has been necessary, as a general rule, to review the shop equipment records only once a year. Exceptions occur when a new product is to be manufactured and study of equipment must be made to ascertain what old equipment can be used, how it can be accommodated to the old and new manufacturing schedules, and what new machines will be required.

One of the great advantages of this plan is the perpetual inventory

(CONTINUED ON PAGE 194)

The Gisholt operator removes
more metal . . . faster . . . to
closer tolerances . . . with
less effort . . . and a minimum
of attention to adjustment.

GISHOLT MACHINE C

Presenting a complete line of MODERN TURRET LATHES

DESIGNED TO HELP YOU MEET HIGHER PRODUCTION REQUIREMENTS WITH LOWER COST OPERATION

RAM TYPE TURRET LATHES
4 Sizes from 1½" to 2½" bar capacity

HIGH PRODUCTION TURRET LATHES
2 sizes—2½" to 3½" bar capacity

HEAVY DUTY TURRET LATHES
4 sizes—4⅝" to 12¾" spindle bore

SIMPLIMATICS
Automatic Chucking Lathes

STATIC BALANCERS

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Machine Tools of the Present A

By A. L. DE LEEUW
Consulting Engineer

THIS is an article for designers and builders of machine tools, written by an engineer who has initiated many well known tool developments. Mr. De Leeuw, for example, in 1897 designed and constructed what was probably the first machine tool having hydraulic feed. He was the first to apply motor control for planers and introduced the double belt drive as well as aluminum pulleys for them. In 1907, he designed a commercial line of machines on the unit principle, or, as it is now called, the "building block" plan. He originated the design for the now universally used wide-space milling cutters with rake and large helix angle and the helical cutter. He has been chief engineer of the Niles Tool Works, of the Cincinnati Milling Machine Co. and of the Singer Manufacturing Co. In addition to his consulting practice, he is vice-president of the Goss & De Leeuw Machine Co.

THE development of machine tools has been one of slow evolution. It does not rest on fundamental knowledge. The processes have been, and still are, entirely empirical. Even today we do not know with any degree of exactitude what happens when a tool produces a chip. Some isolated experiments in the last three or four years have shed some light, however little, on chip formation, but even these experiments do not give us more basic knowledge than we would get about the qualities of steam by measuring the amount of horsepower developed with different steam pressures on various sizes of pistons.

At various times some discovery or some invention has accelerated this process of evolution. The development of the electric motor, the invention of high-speed steel, and of carbide tools have done so. Compare this to the development of the alternating current motor, a development entirely based on the application of mathematics to exact data.

As a result of this absence of fundamental knowledge, the process has been slow and halting. We still use methods and mechanisms which were all right some fifty or a hundred years ago, which were, one might say, the only things that could have been used at that time, but which, now, have no justification. We use them or do them because they have always been used or done.

As an example take the tools used in lathes, planers, shapers, and vertical boring mills. Before the slide rest was invented the workman at a lathe used a tool with a very long shank which he held between his body and his left arm, guiding it with his right hand. The tool was horizontal because the man was vertical. It was no longer necessary to use a horizontal tool after the slide rest came into use. A little analysis would have shown that it should be held in such a way that the resultant of the forces acting upon it would be in the direction of the tool. We are now perfectly familiar with such analyses, but the tool is still horizontal in the lathe—that is, almost at right angles to the resultant of the forces; and the same is true of the planer, shaper, and boring mill tool.

We may expect that someday some machine tool manufacturer will tear himself loose from old practice and produce a machine in which the tool is held in such position.

Development Toward Ideals

Similar instances of neglected opportunities might be mentioned, but before doing so it may be well to follow the lines along which machine tools have been developed and to see to what extent the ideals have been reached; in other words, how near the things that have been done come to the things that may be done.

Developments have been along the lines of power, rigidity, and handiness (convenience).

No great difficulties were met in the increase of power to bring the machine in line with the greater capacity of the newer tool materials. When high-speed steel first appeared, a well-known machine tool builder of that time said, "Give me a tool that will stand it, and I'll build you a machine that will make a chip a foot square in section." Slightly overstated, perhaps, but the author found no difficulty in the design of a lathe that would take simultaneously four cuts 1-in. deep and with a feed of ¼ in., or a planer that would take four cuts 2 in. x ¼ in. or a slotter that would cut off a slab 3 in. x ¼ in.

And the Future

A. L. DE LEEUW

What the author did not know, and what he does not know now, is how much power would be required if the tool were of the best possible shape, for he knows this much—that but a very small portion of all the power required is needed to separate the chip from the work. All the rest of the power is spent uselessly. No, not uselessly, but destructively, for it tends to break down machine and tool. It is used to break up the chip into innumerable small sections, to make these sections slide over each other, and the entire chip over the tool, all under very heavy pressure.

Now, it has been demonstrated by experiment that much of this unnecessary and destructive work can be eliminated, and along this line future developments may be expected. Not only is the amount of power required for the removal of a given amount of metal materially reduced, but, as less heat is generated, it becomes possible to cut at much increased speeds, in some cases several times as high as what one can obtain with carbide tools.

More power may be required because the chips are of heavier cross section or on account of the higher speed. The first case calls for heavier gearing, more rigid frame, etc.; while in the second case better bearings and better balancing are needed. It is the second case which is the cause of the now common use of ball and roller bearings. And yet even these have an intrinsic fault in that they cause vibration, especially at moderately high speed, though at extremely high speeds these vibrations are no longer created. It is customary to try to overcome this trouble by preloading the bearings, but this is only a partial remedy.

It may be said, then, that the problem of high speed bearings for machine tools is not yet solved—at least not completely. Though it is now possible to take care of most of the shafts in a machine at any practical speed, this cannot be said about the most important shaft of all, the spindle.

Hydraulic Feeds and Speeds

One of the most notable developments in recent years was the introduction of hydraulic feeds and speeds in machine tools. It was realized for many years that there was an advantage in having a great many possible feeds and speeds, particularly so if it would be easy to change from one speed to another. The hydraulic system meets the highest possible ideals to the full—at least in theory. It is claimed that it will produce feeds from zero up to a maximum by infinitesimal increments. As a matter of fact, unavoidable practical conditions do not entirely allow this. Nevertheless, there is enough range, and it is so easy to change from one feed to another, and the increments are so truly infinitesimal, that one may forget that the hydraulic feed in practice does not come up entirely to the claims of the enthusiasts. However, what it lacks is definiteness. It is not possible to use it where it is necessary to maintain a definite relation between the amount of feed and the number of revolutions of the spindle. In other words, it cannot be used for such things as screw cutting, or for any operation where uniformity of feed is essential.

It should not be thought that such definiteness cannot be reached. Long before hydraulic feeds became the accepted thing, the author constructed a very heavy machine, requiring a feed pressure of 300,000 lb., and where it was essential that the feed should be uniform, and he did this by means of mechanically controlled hydraulic feeds. It is rather surprising that this same, or some similar, method has not been more largely followed up to the present. This method of positively controlling hydraulic feeds would make it adaptable to various requirements. For example, it could be used for screw cutting, or for drilling in material which has flaws, or for preventing a drill from breaking through and thus ruining itself. It might be used in automatic machines. It is, of course, possible, at the present time to use it in an automatic machine where only one member is subject to feed movement, but where there are different members that must cooperate; such, for instance, as the turret slide and cross slide in a screw machine, there the hydraulic feed is no longer applicable, yet by mechanical control such cooperation would be made possible.

The gears needed for such control can be very small. Theoretically the gears in a lady's wrist watch

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would be large enough, though this is not recommended in practice.

Combining Hydraulic With Cam Feed

There is another possible application of the hydraulic principle which seems to have been overlooked, namely the combination of hydraulic and cam feed. The advantages of a cam feed for a number of machines are well known. A single element, the cam, gives a variety of feeds, a dwell, a quick advance, and a rapid return, while it is being rotated at a uniform speed. This speed may be varied by pick-off gears or any of the many well known speed changing devices. The limitation of the cam lies in the fact that the stroke is short, unless its diameter be made of an impractically large size. The reason is that the angle between cam groove and axis must be large.

The combination of cam and hydraulic power permits of very much longer stroke. The hydraulic part furnishes the power, while the cam is the restraining and controlling member.

The hydraulic drive is still conspicuous by its absence, though several attempts at a solution of this problem have been made. The main reason for this failure seems to be that the highly refined workmanship required for such a device makes it too expensive for general application. The author is sure that much simpler hydraulic motors than those now made can be constructed. Such a motor would be useful for moderately low and high speeds. The very lowest speeds would require a very large motor or a very high pressure, either of which would be objectionable. The very highest speeds would present the difficulty of great volume or high speed of the oil.

Whatever the difficulties may be along the lines mentioned here, it is well to keep in mind that no problem is impossible of solution so long as it does not war against the laws of nature, of mechanics, or mathematics, and it should not be surprising if solutions were found tomorrow, provided such solutions promise good return for the effort made.

Improvement Versus Habit and History

Machine tools of the present day are more rigid than those of the past. There is no question about that. But the question may well be raised if they are as rigid as they could be made. Here, too, old habit and history have combined to block progress. Our lathe beds are still of the ladder type. There is a front and a rear web, joined by ribs, notwithstanding that no one would deny that the closed box form would be more rigid. The excuse for the present construction seems to be that it is the only construction capable of taking care of the chips. However, if we would forget past history and habit for a moment, we would see that it is very well possible to make the bed of box form and dispose of the chips even better than at present.

The upright drill press is another example of history being the villain in the play. However, the lack of logical construction is not so glaring as it was with the lathe, for there are still many conditions where the present construction is logical. More of this later in the article.

The knee and column type milling machine presents an example of old and new history. It had been customary for many years to use a round bar for over-arm, notwithstanding that such a construction does not provide a positive lineup between the outboard bracket and the spindle. The square over-arm, which is the logical thing to use, is now being used to a certain extent. It is not only that such an over-arm produces a positive alinement and is more rigid than the round one, but it also provides a means for various accessories and special attachments.

Many other examples could be mentioned as to failure to make full use of the possibilities in the design of such machines as planers and vertical boring mills.

Development in Convenience

The line along which machine tools have progressed most completely is that of convenience. Further developments may be expected more in fixtures and accessory devices than in the machines themselves. However, there is one line of development which holds promise of great improvement. In one of the articles the author wrote on machine tool design published a number of years ago, he called the attention to a possible improvement in machine tools of a type halfway between automatic and hand machines. The device discussed there was what he called a "program mechanism." Though such a program mechanism has not yet been embodied to the fullest extent in any existing machine tool, progress in that direction has been made. It is now possible to change speeds or feeds in some machines by means of a single lever or handwheel, so that it is no longer necessary to read an elaborate chart of instructions and move a number of levers to obtain a desired speed. At least one company has gone further in this respect, going out from the logical idea that the operator of a machine is not interested in the number of revolutions of a spindle, but in the cutting speed which he desires to get. And this company has designed a device by which the operator moves one lever and obtains the cutting speed indicated on a dial.

Automatic Instructions

When an operator has to make frequent changes of speeds or feeds on a single piece of work, he should have full instructions as to what he should do at the various steps of that operation. It is a matter of fact that if the operator were left entirely to his own devices, it would be very rare to find that two operators would choose the same feed or speed for the same piece of work. And so it becomes necessary for someone to give instructions and put them down in such a way that the operator knows at every step what feed or speed to select. This can be done by giving him an instruction card, but it would be better if the machine were arranged in such a way that the machine itself indicates what the next step shall be. To a certain extent, this has been carried out in at least one type of machine, and it should be carried out on many other types.

Though, in a way, a chuck is an accessory, yet it is such a necessary addition to many machines that it might almost be considered a part of the machine itself. The ordinary three or four jaw lathe chuck is an inefficient device; most of the power, furnished by the workman, is lost. Some improvements have been made in late years, but much room is left for further advances.

Standard and Special Machines

Hydraulic, pneumatic, and electric devices have been developed, but they are applied mostly to specialized machines. Practically nothing has been done along these lines for the general utility machines.

The fact that there is an uncertain dividing line between stand-

(CONTINUED ON PAGE 215)

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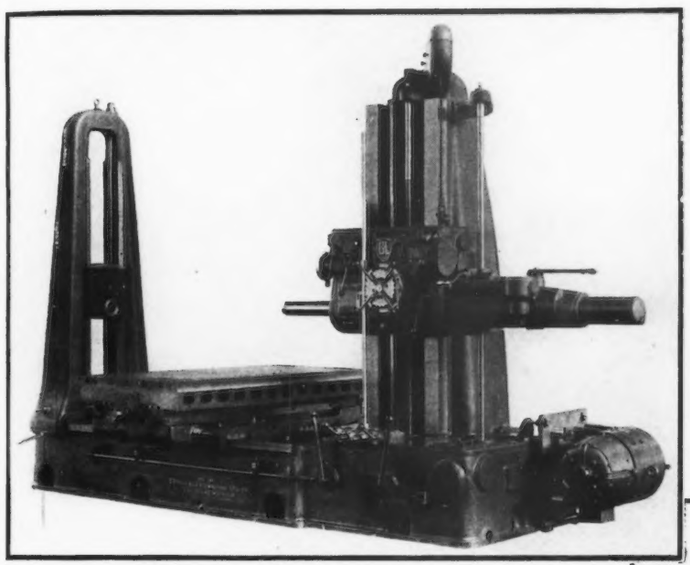

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Vertical travel of spindle head	48"
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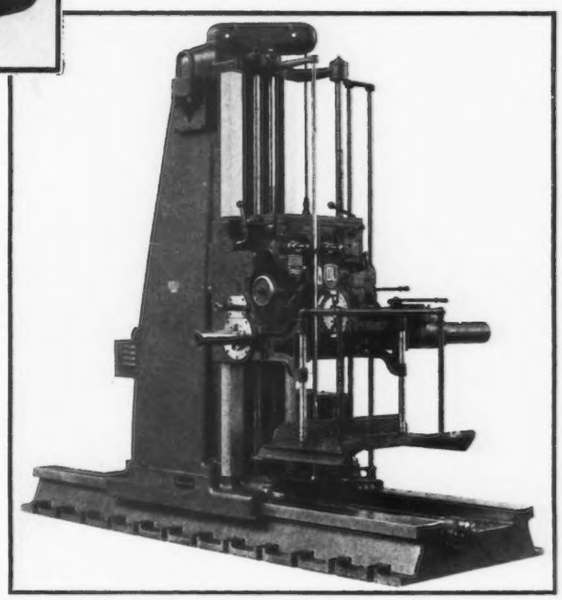

No. 350-FQ FLOOR-TYPE MACHINE →

Diameter nitralloy spindle	4-½"
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It would take all the pages in this magazine to tell you adequately what you can see for yourself in an hour here. Don't miss this opportunity. Bring yourself up-to-date on "Accuracy" in the industry, and on all the new features of machine tools that you must know about or lose step with progress.

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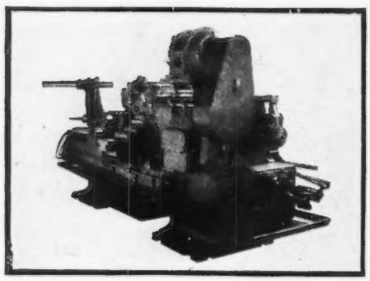

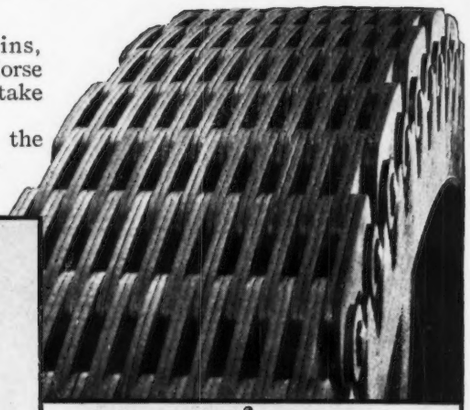

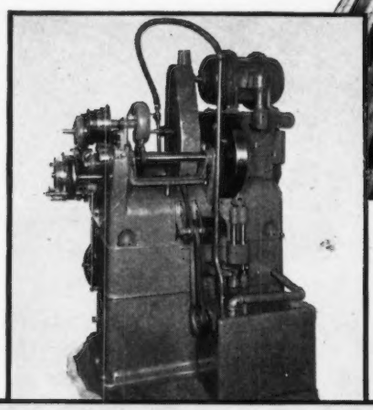

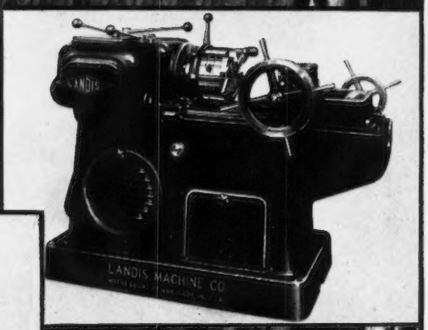

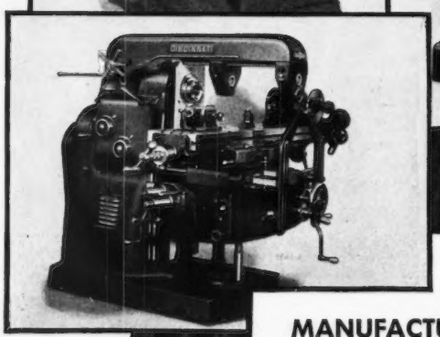

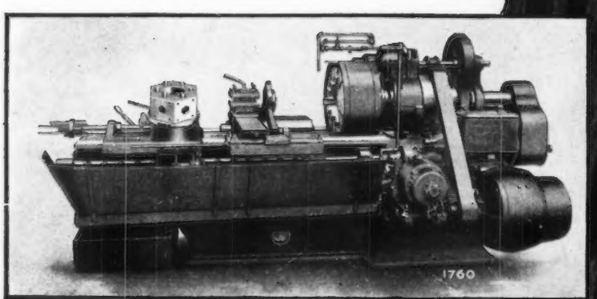

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Metal Cutting Tools Keep

MR. d'ARCAMBAL has been associated with the Pratt & Whitney Co. since 1919, first as chief metallurgist and more recently as sales manager for the small tool and gage divisions and as consulting metallurgist for all divisions. Following graduation from the University of Michigan in 1912, he was chemist and metallurgist of automotive plants in the Detroit district, and in 1918 joined the Wright-Martin Aircraft Corpn. as chief metallurgist. Mr. d'Arcambal is a member of a number of technical societies, including the American Society for Metals, which he served as national president in 1932.

RECAPITULATION of the status of cutting tool developments is always of interest but especially so in periods of extensive machine tool redesign, such as the present. As maximum utility of the machine depends a great deal upon the cutting tools employed, and vice versa, there is a continuing complementary competition between the small tool and the machine.

We are pleased to present, just prior to the Machine Tool Show, therefore, this article by Mr. d'Arcambal, a prominent authority. The article is divided into important developments in (1) small tool design, (2) in cutting materials, and (3) in hardening treatments. The last named, with brief notes on gage developments, will be included in the next issue of THE IRON AGE.

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MARKED progress has been made during the past few years in machine tool design. Rugged and efficient 1935 machine tools run at high speeds under heavy feeds, and have an inherent precision lacking in tools only a few years old. Numerous machine parts are fabricated accurately from heat-treated alloy steels possessing excellent physical properties and wear resistance. Engineering departments of machine tool plants today are specifying tolerances on important parts that would have been considered impossible on a commercial basis a decade ago. These close tolerances have resulted in the liberal use of gages of various types to insure the accuracy and close fits of the large number of parts entering into the construction of the modern machine tool. Improved mechanical control, larger electric motors, proper application of hydraulics, greater strength and accuracy of component parts, proper tool supports, simplified design, all add to qualify machine tools as "The Master Tools of Industry." Plants equipped with these modern, efficient machine tools are turning out a better quality product at a considerably lower cost than it was possible to attain with machine tools of earlier design.

Fortunately there has been an equal advance and development during the past few years in metal-cutting tools, commonly known as small tools. Machine tools cannot deliver maximum production and quality unless properly equipped with the best cutting tools. This article features the more important developments in small tool design, cutting materials and hardening treatments during the past 10 years.

The three important factors that govern the life of metal cutting tools such as drills, reamers, taps, dies, cutters, hobs, etc., are: 1—Design of the tool; 2—material employed; and 3—hardening treatment.

Design of Tool

Cutting tools today are required to machine parts made from a wide range of materials. These include many different types of aluminum and other light metal alloys, special brasses and bronzes, alloy cast iron, natural and heat-treated steels of the simple and alloy types sometimes having a Brinell hardness of 300 and higher, stainless steels, high-carbon high-chromium alloys and the like. Small tools designed for use on the usual run of steel jobs will not function satisfactorily when machining certain light metal alloys. A different design again may be necessary for use on brass, etc. Manufacturing plants prefer stocking so-called general purpose tools, but where appreciable quantities of material other than iron and steel are being fabricated it is economical to purchase tools specially de-

p Pace with Machine Tool Progress---I

By A. H. d'ARCAMBAL
Consulting Metallurgist, Pratt & Whitney Co., Hartford, Conn.

o o o

signed for use on the particular alloys being machined.

Precision manufacturing is now the rule rather than the exception. The products of our great American manufacturing plants are held to extremely close tolerances. This closing in on tolerances has compelled the cutting tool manufacturers to greatly improve the quality of small tools. Precision cutting tools today must not only be held to closer limits in diameters, but great care must be used to insure the tools having the proper degree of relief, correct rake angles, suitable number of cutting teeth, proper spirals, satisfactory grinding finish, etc.

Better Product at Lower Cost

It is interesting to note that many products of our large American industrials, while of better quality today than a short time ago, are being marketed at more attractive prices than formerly. The automotive industry is a good example. Compare the automobiles of 10 years ago with the 1935 models, not only for appearance and ease of operation but also for dependability and economy. The parts entering into the manufacture of the modern car are held to extremely close tolerances, resulting in a smoother performing and longer lasting product. The automotive manufacturers are marketing this higher quality product at a considerably lower price than formerly. This would not have been possible were it not for the fact that the automotive industry has taken full advantage of the remarkable developments in machine tools, metal-cutting tools and gages. Through the use of proper cutting tools and modern machine tool equipment the large number of engine parts made from the many new materials and heat-treated alloy steels are accurately machined at a much lower cost than parts made from inferior grades of materials with comparatively poor physical properties, formerly used.

Many important changes in the design of precision cutting tools have been made during the past decade. We will outline briefly some of the more outstanding developments.

Twist Drills

Figs. 1-5 show a few interesting types of twist drills of fairly recent development. The introduction and wide use of so many new materials has made it necessary for drill manufacturers to stock specially constructed drills. Ordinary twist drills will not give proper service on all of the newer materials.

Drills for use on plastic materials such as bakelite, as well as for hard rubber and fiber, must have a slower spiral, wider flutes and a special temper to stand up properly on this abrasive material.

Drills for use on aluminum alloys must have a very fast spiral. This type of drill with slight modification is also being used successfully in slate, marble, etc.

A recent development is the high-speed steel cotter drill which was designed for cross-drilling bolts, steering arms, knuckles and other jobs where severe drilling conditions are encountered. These drills are made heavier in the web and have a special 135-deg. point.

FIG. 1—Slate drill.

FIG. 2—Bakelite drill.

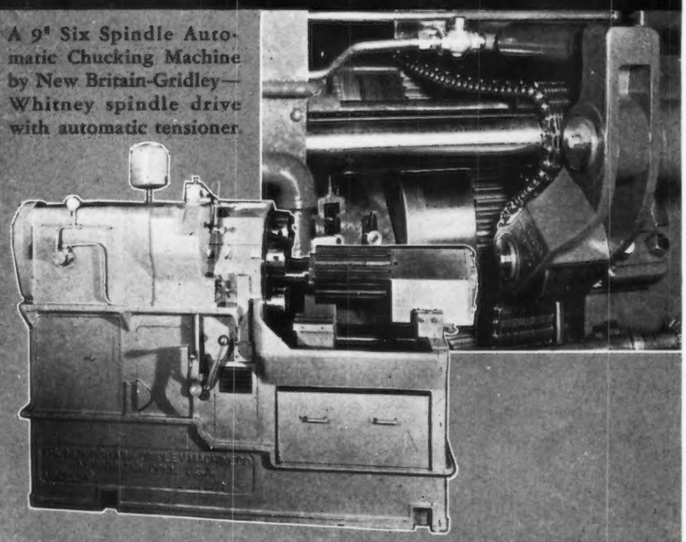
FIG. 3—Double-diameter or two-step drill.

FIG. 4—High-speed steel cotter drill.

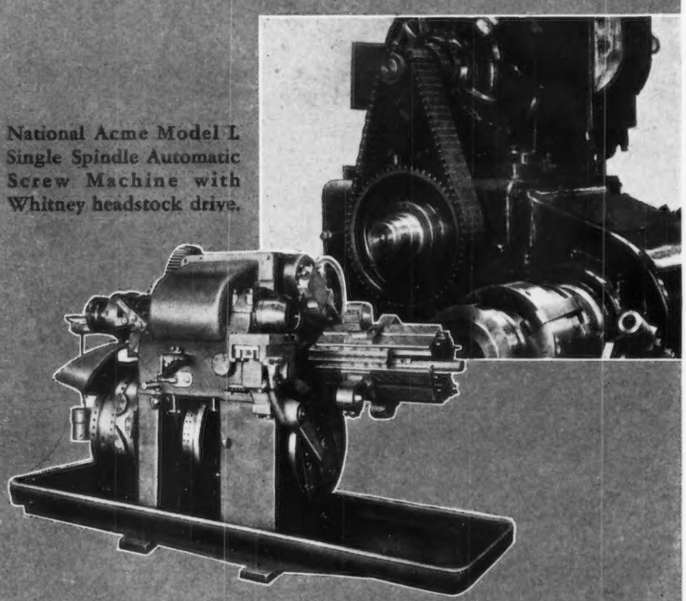
FIG. 5 — 135-deg. point angle cotter drill.

Chain Drives

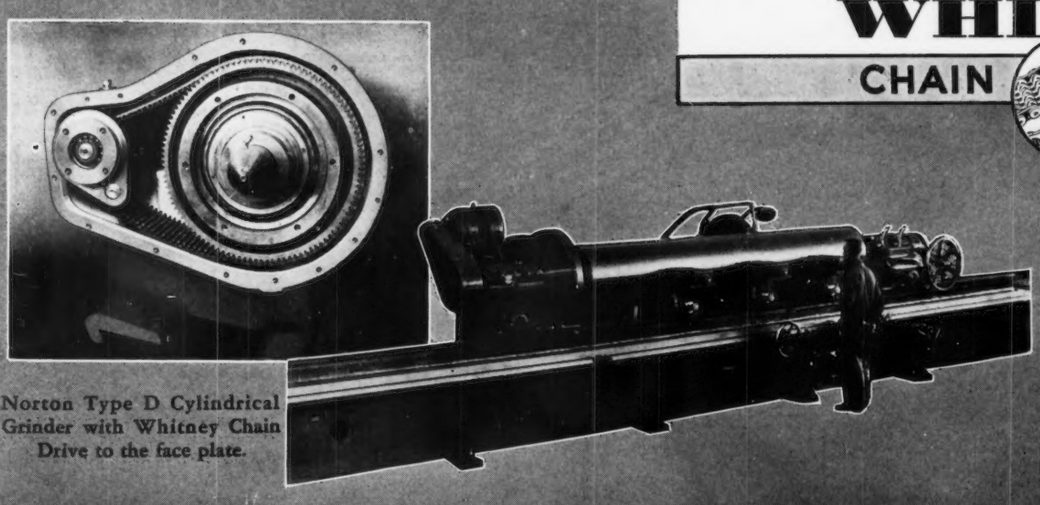
ON MODERN MACHINE TOOLS



A 9" Six Spindle Automatic Chucking Machine by New Britain-Gridley—Whitney spindle drive with automatic tensioner.



National Acme Model L Single Spindle Automatic Screw Machine with Whitney headstock drive.



Norton Type D Cylindrical Grinder with Whitney Chain Drive to the face plate.

JUDGED by every standard of power transmission performance, Chain Drives meet the most exacting requirements. Power when it is needed, constant speeds without slippage, capacity to handle sudden overload demands — these are a few of the many advantages which combine to make Chain Drives the recognized standard for dependable power transmission.

Whitney Chain Drives offer important economies because they maintain production, are moderate in initial cost and eliminate excessive maintenance expense.

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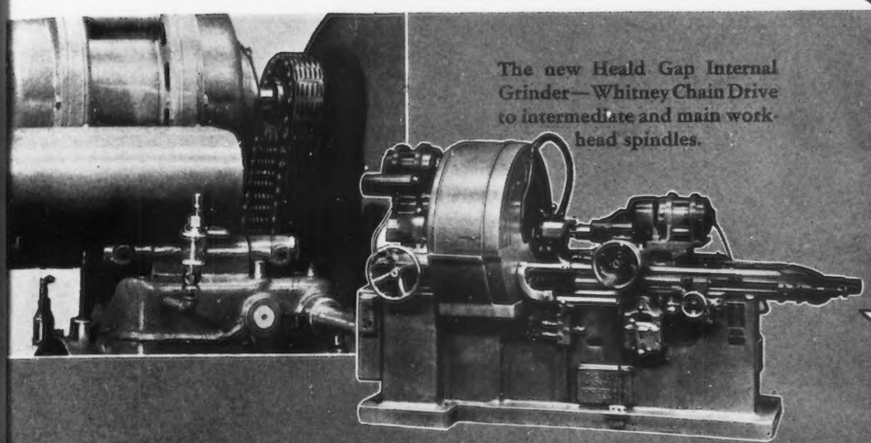
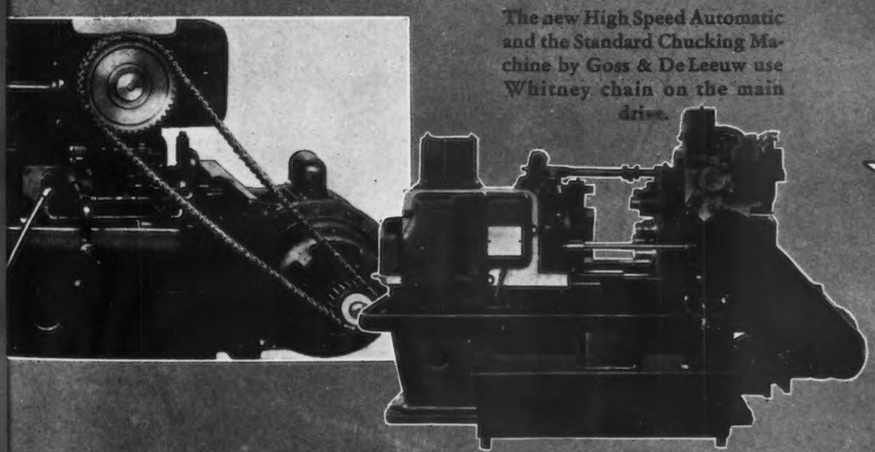
★ CONSTANT SPEEDS



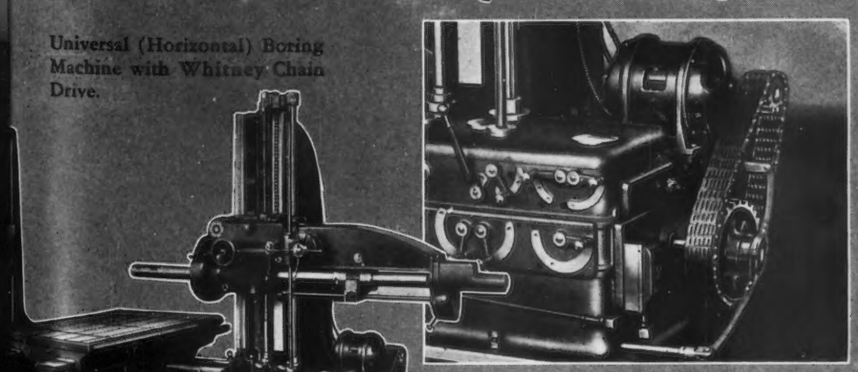
The new Heald Gap Internal Grinder—Whitney Chain Drive to intermediate and main work-head spindles.

★ FLEXIBILITY OF DESIGN



The new High Speed Automatic and the Standard Chucking Machine by Goss & De Leeuw use Whitney chain on the main drive.

★ OVERLOAD CAPACITY



Universal (Horizontal) Boring Machine with Whitney Chain Drive.

★ LOW MAINTENANCE COSTS

★ LONG LIFE

which is found to be notably satisfactory.

A large amount of experimental work has been done in developing a drill for brass, and today there is a stock brass drill giving excellent results.

Another interesting development is the double-diameter or two-step drill. This is entirely different from the old type of step drill, and is really two drills in one, so constructed that the separate cutting lips and flutes permit the chips to be disposed of readily as with a single-diameter drill. The design permits resharpening the cutting lips of the large barrel without injury to the small barrel, as the lands of the small diameter are already formed to size for the full length of the flutes.

Reamer Developments

Fig. 6 shows a few of the recent developments in reamer design. Note the stub screw-machine reamers that are rapidly replacing the more expensive regular machine reamers for use in automatics. These inexpensive stub reamers, when used with proper floating holders, produce very accurate holes with a high quality of finish. Adjustable, serrated-blade reamers are finding favor due to their ruggedness, rigidity, wide range and ease of adjustment, long life and accuracy of work produced. Helical taper-pin reamers have rapidly supplanted reamers with the slower spiral for production jobs. Duplex spiral-taper reamers produce an excellent finish, due in part to breaking up the continuity of the chip. Expansion chucking reamers are being employed economically today. Right-hand spiral-fluted reamers work better on many jobs than the regular left-hand spiral reamers, due to the smoother cutting action which produces a mirror-like finish. Spiral-fluted locomotive taper reamers have replaced the straight-fluted reamers, formerly used by railroad shops, because of their superior cutting qualities and longer life.

Manufacturers at times request reamers having a lapped finish for use in ultra-precision reaming. These tools not only produce a more accurately reamed hole, but the life obtained from the lapped cutting edges is greater than that of reamers with the usual ground finish.

Taps

Many important changes in tap design have been made in the past few years. One of the most important developments was the introduction of the high-speed steel precision ground thread tap. A year or two prior to this, carbon steel ground-thread taps were offered the trade, but the short life obtained from these expensive carbon ground taps did not justify their existence. The automotive industry was the first to adopt the high-speed steel precision ground-thread tap for the large majority of its tapping jobs. In many instances carbon cut-thread taps were replaced with the high-speed steel precision product, resulting in eight to 10 times more tapped holes than were obtained from carbon-steel taps. These ground taps,

FIG. 6—Some recent developments in reamer design. At **A** is shown a spiral-fluted locomotive taper reamer; at **B**, a duplex spiral taper reamer; at **C**, a right-hand spiral chucking reamer; and at **D**, expansion chucking reamers. At **E** is shown adjustable serrated-blade shell reamers; at **F**, helical taper pin reamers; and at **G**, stub screw-machine reamers. All of these tools are of high-speed steel.

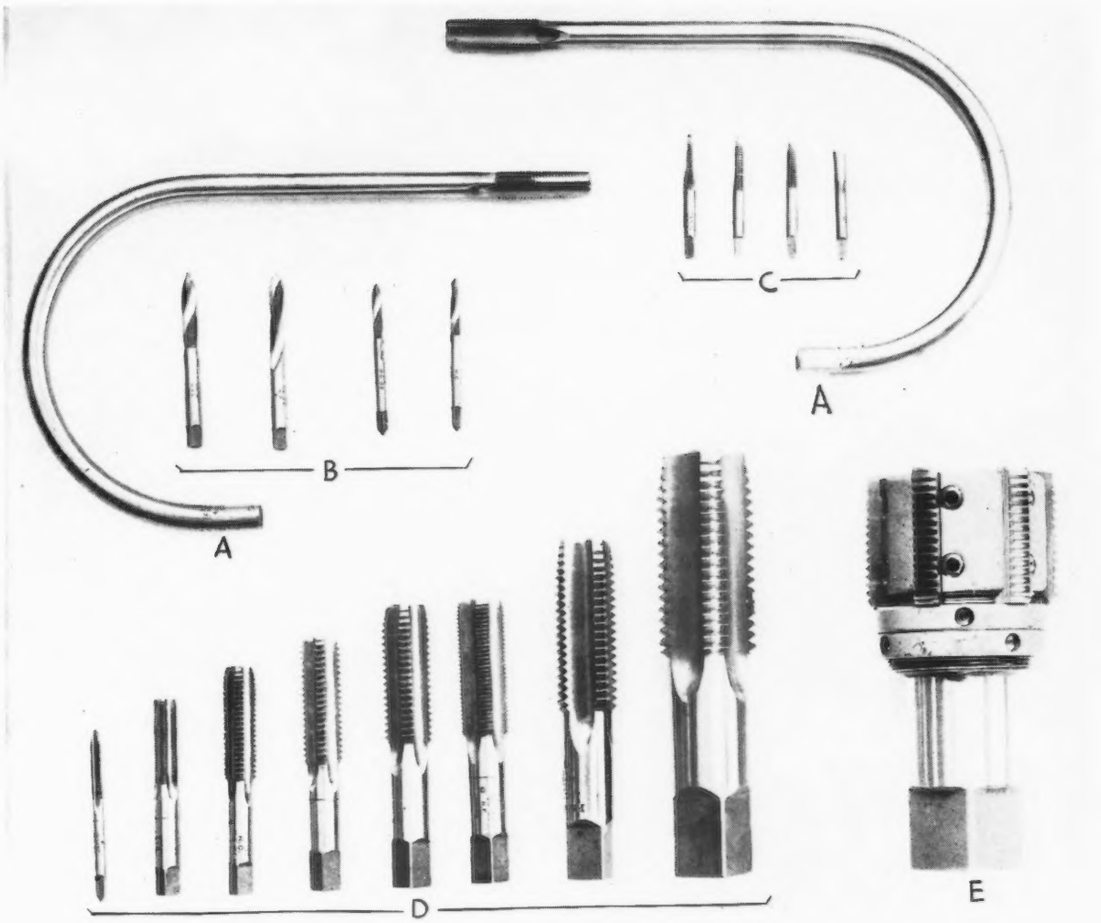


FIG. 7—Group of taps of fairly recent development. Precision ground-thread hook taps are shown at **A**; spiral-fluted taps for aluminum-alloy jobs at **B**; stub screw-machine taps for thin metal work at **C**; ground-thread taps at **D**; and an inserted serrated blade ground-thread tap at **E**.

moreover, produced holes conforming to N.S.T.C. Class 3 tolerance, resulting in closer fits being specified on the more important threaded parts. At a later date high-speed steel commercial ground-thread taps were offered industry, these taps having a somewhat wider pitch diameter tolerance than the precision product. Commercial ground taps in the smaller sizes, under normal operating conditions, produce a satisfactory Class 2 fit. The larger sizes produce holes to Class 3 tolerance. As commercial ground-thread taps are less expensive than precision taps, they have replaced the latter on many operations where the size produced meets the specified tolerance. High-speed steel cut-thread taps continue to find favor on many operations where an extremely accurate fit is not required. The high-speed cut taps produce more holes per grind on many operations than either precision or commercial ground taps. High-speed steel cut-thread taps today are more accurate as to thread form, size, etc., than was the case a few years ago, due principally to improved high-speed steel hardening equipment.

Fig. 7 shows a group of taps of fairly recent development. Note the stub machine screw taps, recommended for use on thin metal jobs. The right-hand spiral fluted taps with highly polished flutes were developed for use on aluminum alloys and die castings. The high-speed precision ground-thread hook taps are producing nuts to N.S.T.C. Class 4 fits on the precision automatic tapper recently introduced by the National Machinery Co. High-speed steel sectional-type staybolt taps (Fig. 8) have replaced the old design solid carbon-steel staybolt taps in a large number of railroad shops. This all-purpose tap with its high-speed steel reamer and threaded section is producing from five to 10 times the number of tapped holes in boiler plate than were obtained from carbon-steel staybolt taps.

Dies

The demand for better thread fits on many operations resulted in increased demand for self-opening dies having chasers either with lapped or ground threads. The male components correctly threaded with precision dies when used in holes produced with ground-thread taps result in quality of fits not previously obtainable. All manufacturers of self-opening dies have greatly improved the design of their product in the past 10 years, splendid results being obtained by industry today from these pre-

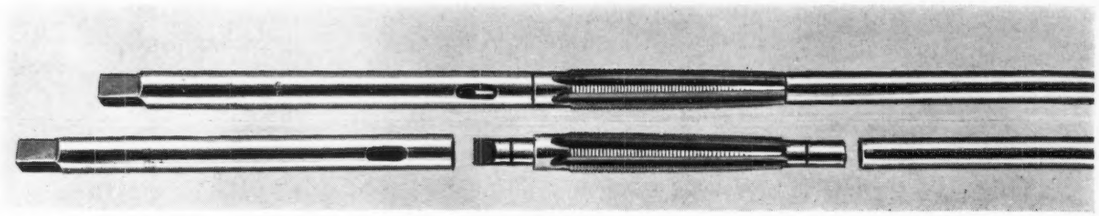


FIG. 8—Sectional-type staybolt tap. With its high-speed steel reamer and threaded section, this tap gives substantial increase in production.

cision tools. Special chaser grinders for correctly resharpening chasers to assure proper chamfer and rake angles for the type of material being threaded are now in common use.

There continues to be a considerable demand for the inexpensive adjustable round split dies, spring screw dies, etc., for use on automatic screw machines and the like. Here again the manufacturers have improved the quality of their dies within recent years with resultant greater accuracy and longer life.

Splendid progress has been made in milling cutter design. Compare the typical modern cutters shown in Fig. 9 with cutters formerly used by the trade. Cutters used years ago were straight fluted, had little or no rake and insufficient relief. As one tool engineer recently stated, the old cutters removed metal by hacking or chopping rather than by cutting. Our modern high-power helical cutters shear the metal at high speeds with heavy feeds and deep cuts, producing satisfactory finishes in conjunction with economical tool life. High-speed steel scalping cutters in gangs as large as 8 in. in diameter and 30 in. long, as shown in Fig. 10, remove the surface from soft metal billets at nearly the speed of woodworking tools. These scalping cutters are run between 1200 and 1500 ft. per min.

(CONTINUED ON PAGE 73)

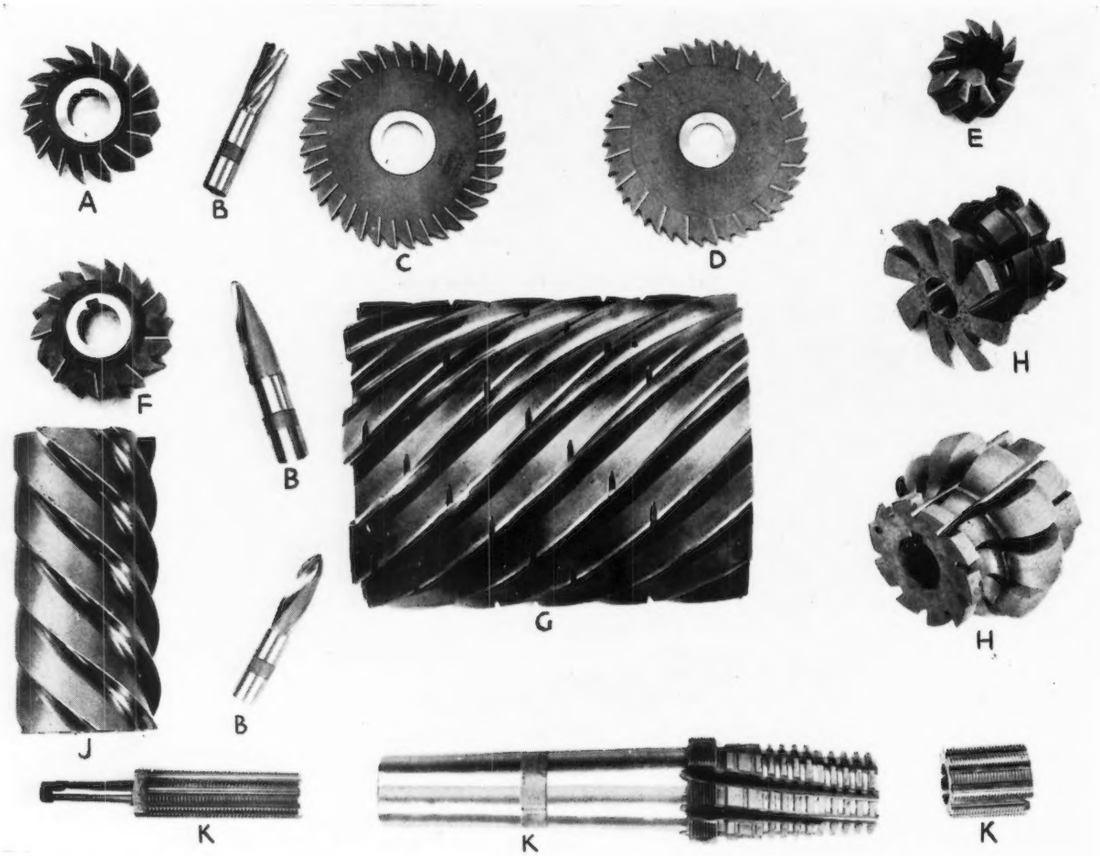


FIG. 9—Modern milling cutters. At **A** is shown a half side milling cutter; at **B**, right-hand spiral-fluted die sinking cutters; at **C**, a metal slitting saw with side chip clearance; and at **D**, a metal saw with staggered teeth. At **E** is shown a deep recessed shell end mill; at **F**, a staggered tooth side mill; at **G**, a scalping cutter section; at **H**, spiral-fluted form cutters; at **J**, a helical slab mill; and at **K**, ground thread-milling hobs. All these tools are of high-speed steel.

(CONTINUED FROM PAGE 66)

with a feed of 20 ft. per min. and a depth of cut of approximately 0.020 in.! Slab milling cutters for use on the usual run of metal jobs have a helix angle as high as 52 deg., 10 to 15 deg. rake tooth face and large bore diameters for proper driving. Staggered-tooth side milling cutters, half-side mills, deep recessed shell and mills, fast spiral end mills of shank-type, metal-slitting saws with side chip clearance, spiral-fluted formed cutters with rake tooth face, spiral-fluted die-sinking cutters with high relief, are all finding increased favor in metal-working plants. For certain jobs, principally gray iron and non-ferrous materials, inserted-blade cutters having blades tipped with cemented carbide or cutters with Stellite blades are in successful operation.

High-speed steel ground-thread milling hobs and ground holes for milling thread rolling dies are being used widely where accurately threaded products are required. These precision ground thread hobs are held to close limits for thread form such as angle, thread depth, top and bottom flats, lead error, etc. Contrary to general opinion, however, these ground-thread hobs in the majority of cases produce only the same amount of work between grinds as obtained from high-speed steel cut-thread hobs of a similar size and pitch.

Many improvements in the design of gear cutters and gear hobs have been made in the past few years. There is an increased demand for gear hobs with ground form, due to the greater accuracy specified for the product.

• • •

Cutting Tool Materials

IN the early part of this century precision cutting tools such as drills, reamers, taps, dies, cutters, etc., were made from carbon tool steel. Mushet and other so-called self-hardening steels, while used to some extent for turning tools, seldom were employed in the manufacture of fine-edged tools. Soon after the classic experiments of Taylor and White (which demonstrated the marked advantage in heating tungsten steel turning tools to almost the melting point instead of the usual cherry red heat during the hardening process) the steel mills in this country and abroad rapidly developed improved types of tungstel tool steels containing high percentages of tungsten and chromium, the carbon content being materially lower than in the Mushet type steel. At a slightly later date the addition of 0.30-0.40 per cent vanadium improved the cutting qualities. These steels responded more readily to the high-temperature treatment. Lathe tools made from these high-speed steels were capable of running at higher speeds, with longer life between grinds than the previous self-hardening steels. At a slightly later date the vanadium content was increased to approximately 0.75 per cent with marked improvement in cutting results. The introduction of properly hardened high-speed steel tools resulted in redesigning machine tools to make full use of the high speeds, heavy feeds and deep cuts at which these high-speed steel tools could be run economically.

It is interesting to note that the

FIG. 10—High-speed steel scalping cutters in gangs as large as 8 in. in diameter and 30 in. long remove the surface of billets at nearly the speed of woodworking tools.

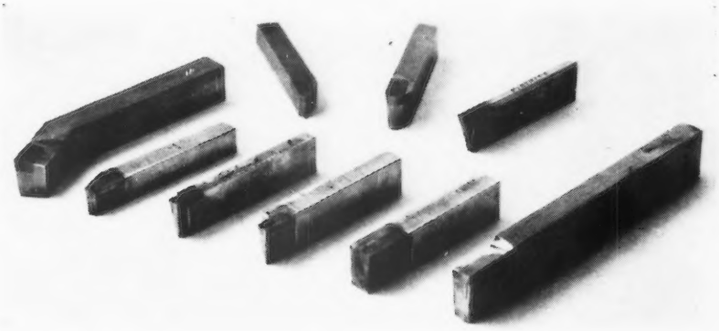


FIG. 11—Tungsten-carbide tools in service today.

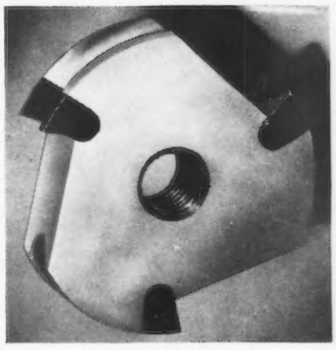
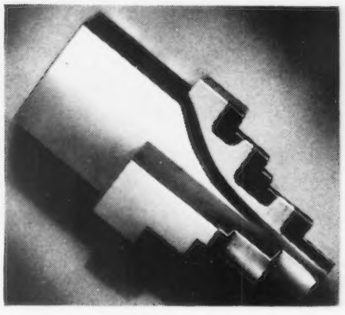
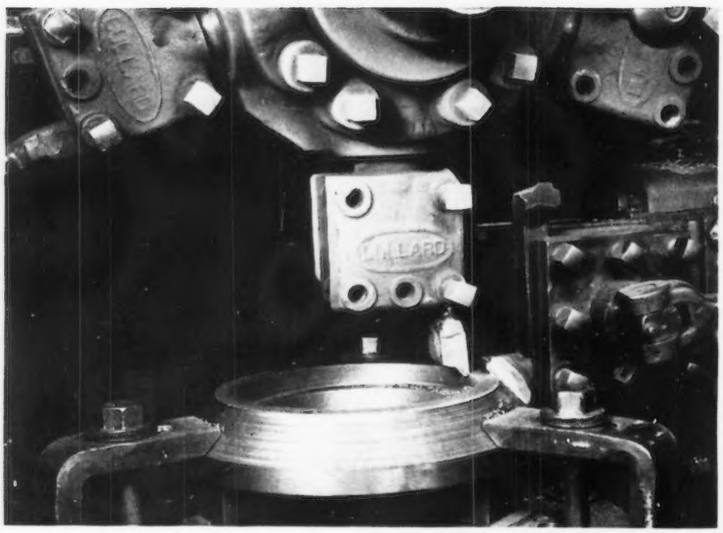


FIG. 12—Circular forming tool with tungsten-carbide-tipped cutting edges.

FIG. 13—Stepped counterbore tipped with tungsten carbide.





ABOVE

FIG. 14—Rough turning cast-iron flywheels with Stellite tool.

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large majority of high-speed steel tools are made today of steel similar in composition to that used 25 years ago, with the exception of a slightly higher carbon and vanadium content. The ordinary high-speed steel today has the following composition: Carbon 0.70 per cent; chromium 4.00; vanadium 1.00 and tungsten 18.00 per cent.

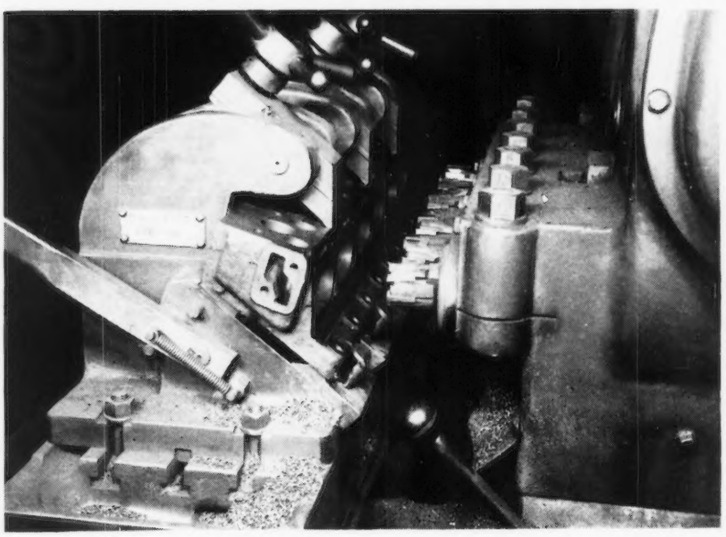
During the past few years there has been an increasing demand for cobalt high-speed steels having either 4 or 8 per cent cobalt. These cobalt steels, possessing marked red hardness properties, are employed to good advantage for steel turning especially on some of the heat-treated alloy steels. Precision cutting tools made of cobalt high-speed steel have the disadvantage of possessing quite a deep, soft skin after the usual hardening operation, as well as not possessing as great toughness as regular high-speed steel treated to the same Rockwell hardness.

New High-Speed Steels

Recently there has been considerable interest shown in high-speed steel of the following composition: Carbon 0.80 per cent; chromium 4.00; vanadium 2.10; tungsten 19.00; and molybdenum 0.60 per cent.

Turning tools, cutters and reamers, as well as broaches fabricated from this high-alloy steel show a longer life between grinds on certain appplications than when the ordinary 18-4-1 type of steel is used. We do not believe, however, that this higher vanadium high-speed steel will find the same general use as the present 18-4-1 type.

Another new and interesting type of high-speed steel is the molybdenum - tungsten material



ABOVE

FIG. 15—Stellite tools boring combustion chambers of cast-iron cylinder heads.

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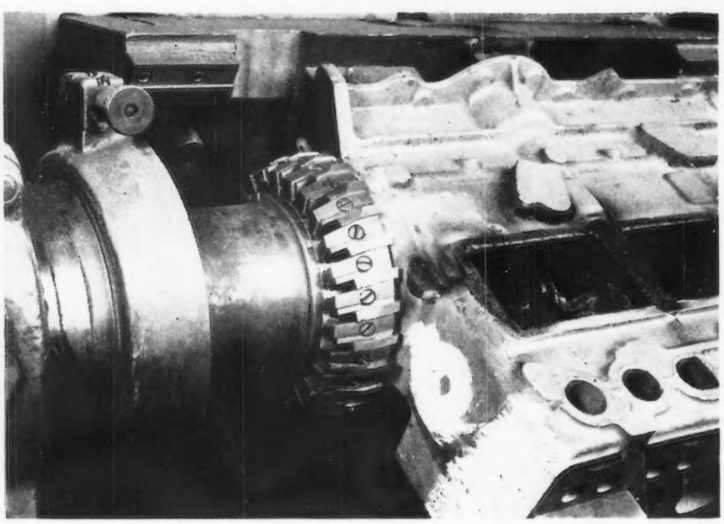
BELOW

FIG. 16 — Milling cast-iron cylinder blocks with Stellite cutter.



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having the following general composition: Carbon, 0.75 per cent; chromium 4.00; vanadium 1.00; tungsten 2.00; and molybdenum 8.00 per cent.

Tools made from this molybdenum-tungsten steel are hardened from a considerably lower temperature than the 18-4-1 type, thus accounting to a great extent for the increased toughness obtained. Here again we do not believe that this material will find very wide use except in an emergency such as war. It is reported that tools of certain types made of this less expensive high-speed steel are giving equal and at times somewhat superior results to tools made of the 18-4-1 type. This molybdenum steel possesses a very deep, soft skin after the usual open-fire hardening operation, due to the volatilization of molybdenum oxide. Tools made from it necessarily must be ground all over after the hardening operation. The salt bath is recommended for the hardening of these molybdenum tungsten tools, as the surface is file hard as quenched from the salt bath.

There has been very little change during the past 25 years in regard to the composition of plain carbon and simple alloy tool steels. Practically all carbon tools are made today from plain carbon tool steel or tool steel containing small amounts of vanadium and chromium. In special cases where hardening distortion is to be kept to a minimum the oil hardening nondeforming types of steels are being used to good advantage. The demand for carbon-steel cutting tools becomes less and less as the years go by. Practically all milling cutters, the large majority of drills and reamers, and majority of taps, except in the smallest sizes, today are made from high-speed steel.

Well over 90 per cent of all high grade carbon, alloy and high-speed tool steels now produced in this country is melted in the electric furnace, as contrasted with the crucible process used prior to the World War. It has been our experience that electric tool steel, if properly melted and fabricated, is superior to the crucible product for uniformity and general quality.

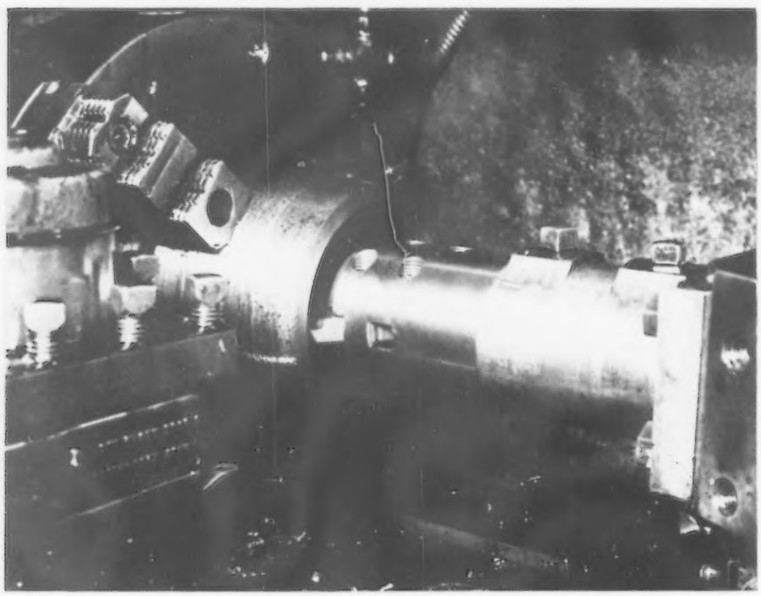


FIG. 17—Boring S.A.E. No. 6135 steel (hardness 37-40 Rockwell C) with Stellite tools.

Cemented Carbide an Outstanding Development

The outstanding development in recent years in regard to cutting material has been the introduction of cemented carbides, notably tungsten carbide. Unfortunately this material was not marketed properly in the early stages of its development, tools tipped with it being recommended for all types of jobs regardless of the kind of material being machined. It was soon learned that cemented tungsten tipped tools of proper design gave phenomenal results on non-metallic materials, excellent service on non-ferrous jobs and cast iron, but failed when used on steel jobs. The lip surface of the tungsten-carbide-tipped tool when used on steel turning quickly developed a deep chip cavity, with resultant generation of intense heat at high cutting speeds. This formation of the deep chip cavity at times resulted in a section of the tip being sheared off. Tools with these deep chip cavities were very expensive to regrind because of the large amount of carbide it was necessary to remove. Chipping and breaking of the carbide was another cause of early failure due to the brittleness of this hard cutting material.

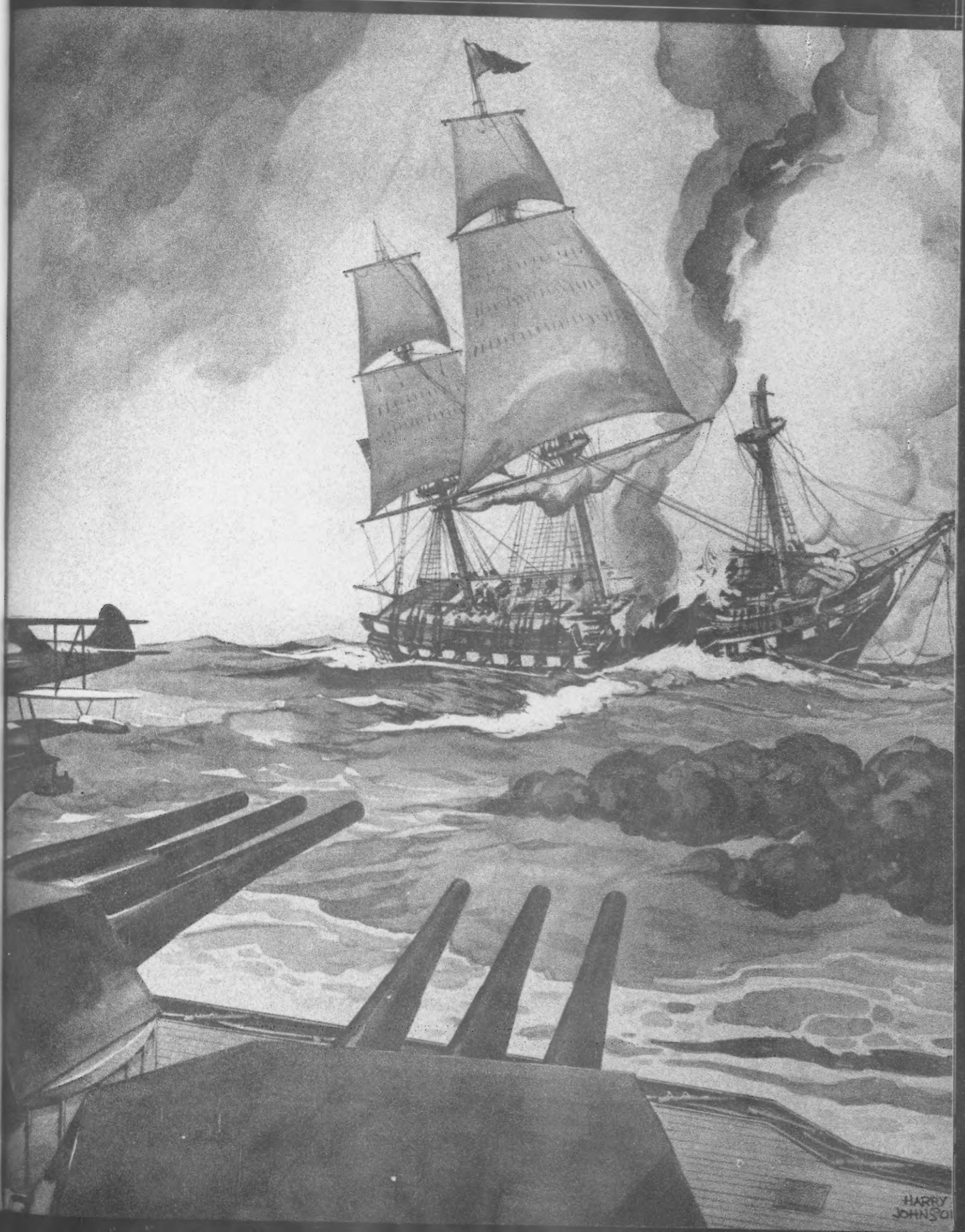
New Grades Developed

During the past two to three years, manufacturers of cemented carbides have through intensive study and experimentation, not only improved the quality of the cemented tungsten carbides, but developed new grades of similar cemented materials. Tungsten carbide with 3 per cent cobalt is the hardest commercial grade for cutting, its principal field being for finishing operations. The general-purpose grade containing 6 to 8 per cent cobalt, today is giving from 20 to 40 per cent more service due to improved manufacturing technique. Cemented tungsten carbide, with cobalt content 8 to 13 per cent, is of greater toughness and lesser hardness than the lower cobalt materials, and is being used widely for wire drawing dies and some intermittent cutting operations.

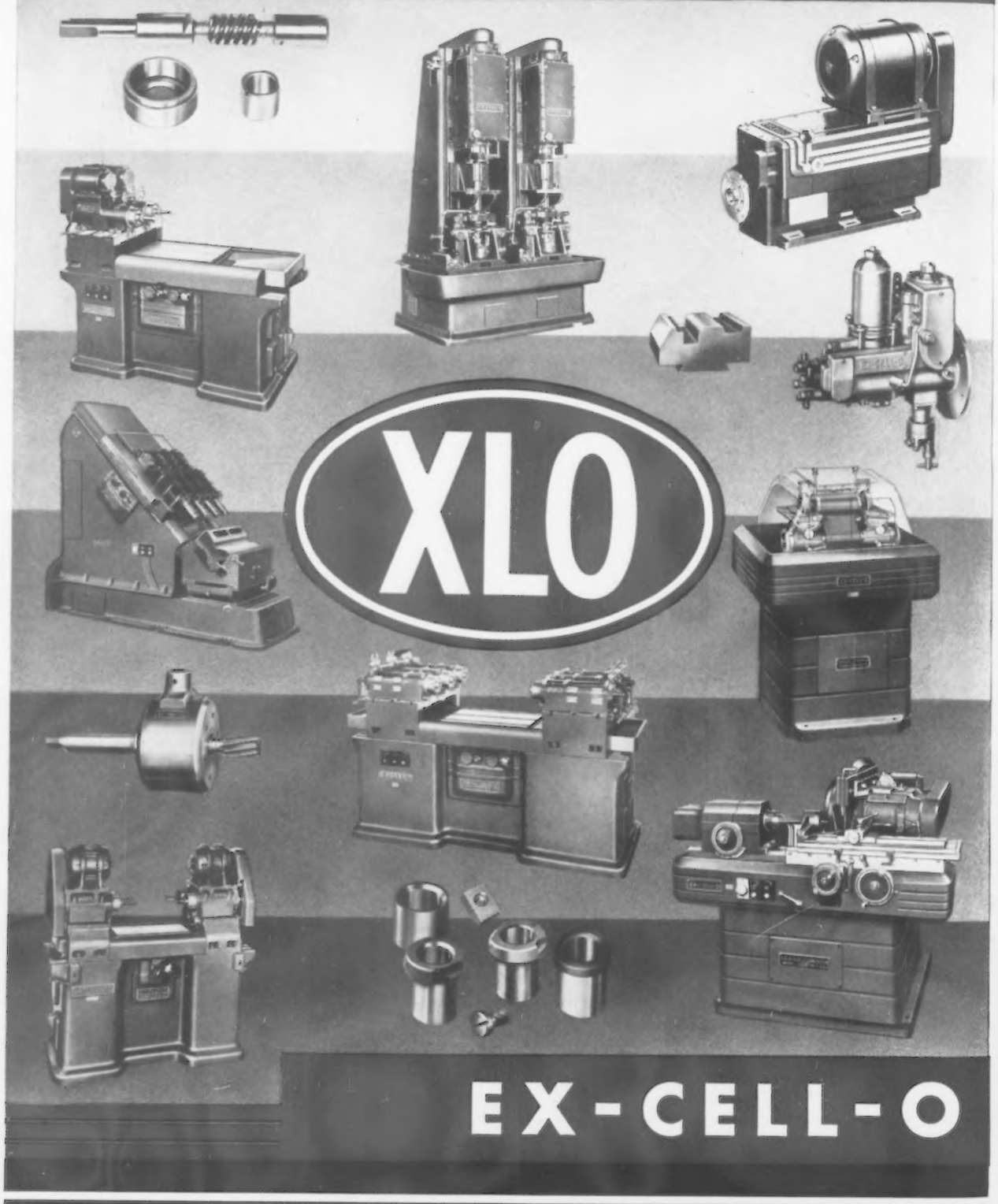
Cemented tantalum carbide was developed for steel turning operations. This material has a lower coefficient of friction than tungsten carbide, resulting in lower temperatures being developed during cutting, and so delaying the formation of a chip cavity. Tantalum carbide has proved to be not entirely satisfactory for steel operations, and further development is necessary before this material will enjoy the same order of extensive use in the steel field which the tungsten carbides have unquestionably obtained on non-metallic materials, non-ferrous metals and cast iron. Cemented titanium carbide, a recent development, is being employed satisfactorily on some steel jobs, principally high-speed, light-

(CONTINUED ON PAGE 226)

MODERNIZATION



MODERN MACHINES AND TOOLS



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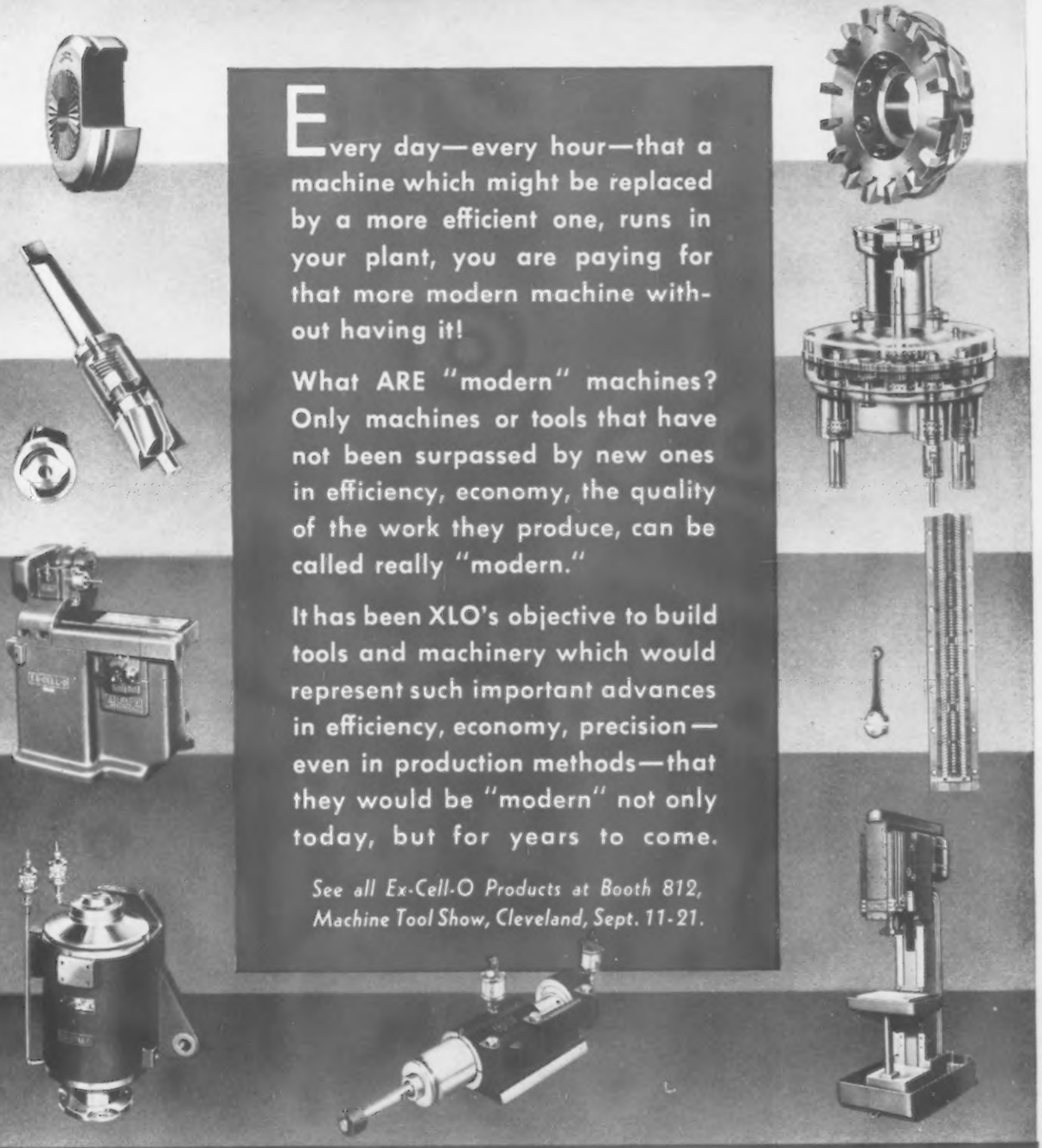

Every day—every hour—that a machine which might be replaced by a more efficient one, runs in your plant, you are paying for that more modern machine without having it!

What ARE "modern" machines? Only machines or tools that have not been surpassed by new ones in efficiency, economy, the quality of the work they produce, can be called really "modern."

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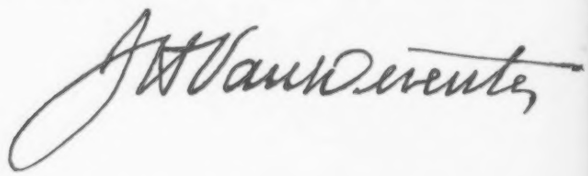
You will see most of these "master tools of progress" at the National Machine Tool Builders' great Exposition in Cleveland during the coming two weeks, together with many other production profit makers that have been made available since the beginning of the depression and which are now ready to play their part in the great American Modernization Movement.

That movement is now under way. It will not halt or hesitate until American industry, through intelligent replacement of its equipment, has placed itself on an efficiency level that will bring back to America and to American consumers, the fullness of living and the power of possession that have been taken from them by depression and by demagoguery.

The improved machine tool is a real social reformer. It says nothing, but does much. It is a wealth creator that works for the many day in and day out, patiently and tirelessly, asking no favors but bestowing them broadcast.

Youth will be served. The saying is as true of machines as of men. We must give youth a chance to serve, through the practice of Modernization.



Our thanks to the following companies for providing the art studies from which the frontispieces of the subsequent sections were made:

Brown & Sharpe Mfg. Co.
Cincinnati Milling Machine Co.
General Electric Co.
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National Acme Co.
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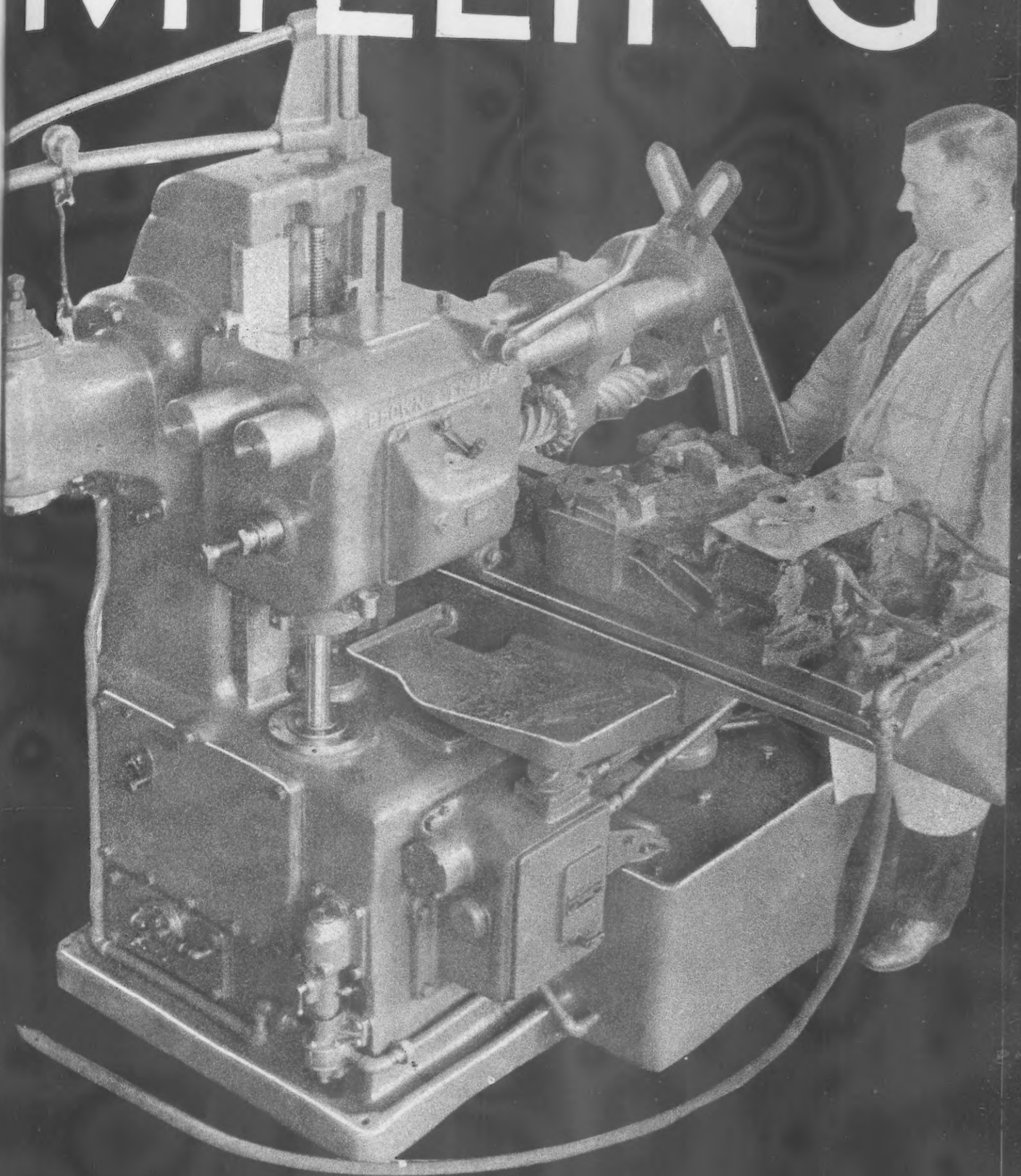
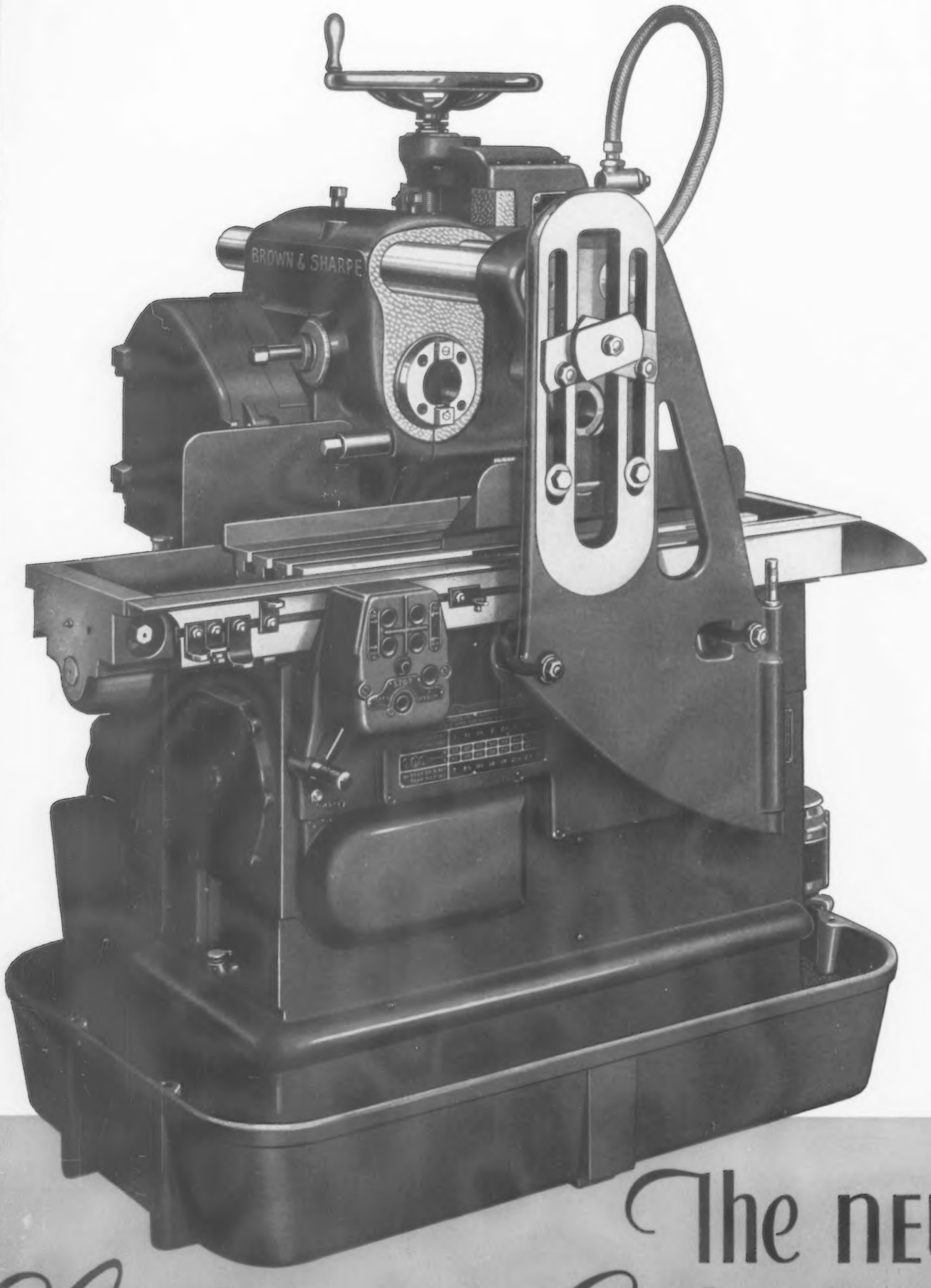
Norton Co.
Warner & Swasey Co.

MILLING





The NEW Electrically Controlled

Opening a NEW ERA *in* PRODUCTION MILLING

- Complete electrical control of table and spindle movements.
- Automatic backlash eliminator on table feed screw permits "climb" or "hook" milling.
- Dual table feed rates, automatically controlled.
- New rapidity of set-up.
- Unusually complete ranges of feeds and speeds.
- Automatic reverse in cutting feed.

Particularly advantageous for milling with formed cutters in steel.

BROWN & SHARPE No. 12 PLAIN MILLING MACHINE

. . . SEE it

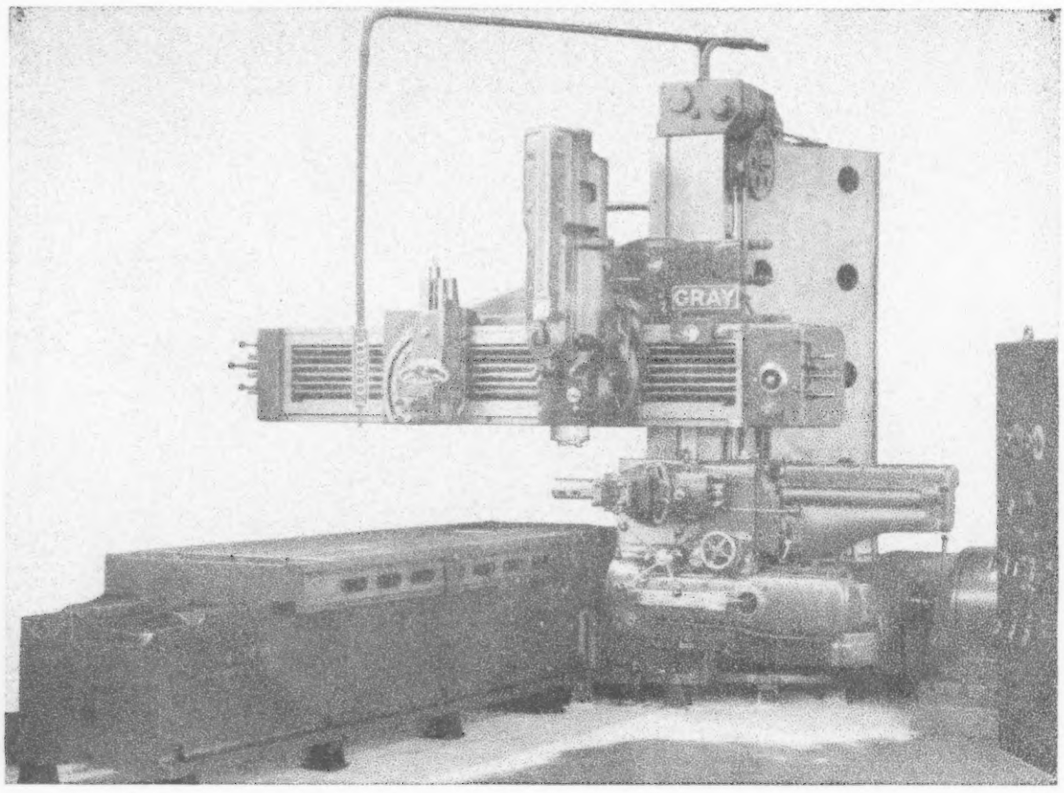
in operation at the Mac
Tool Show, Booth 27—to
you visualize

B·S

its production possibili

BROWN & SHAR
MFG. CO.
Providence, R. I., U. S

MILLING



GRAY Milling Planer is a new cost-cutting machine tool which has great flexibility and adaptability. Quickly converted from planing to milling, it reduces overhead by multiplying working possibilities.

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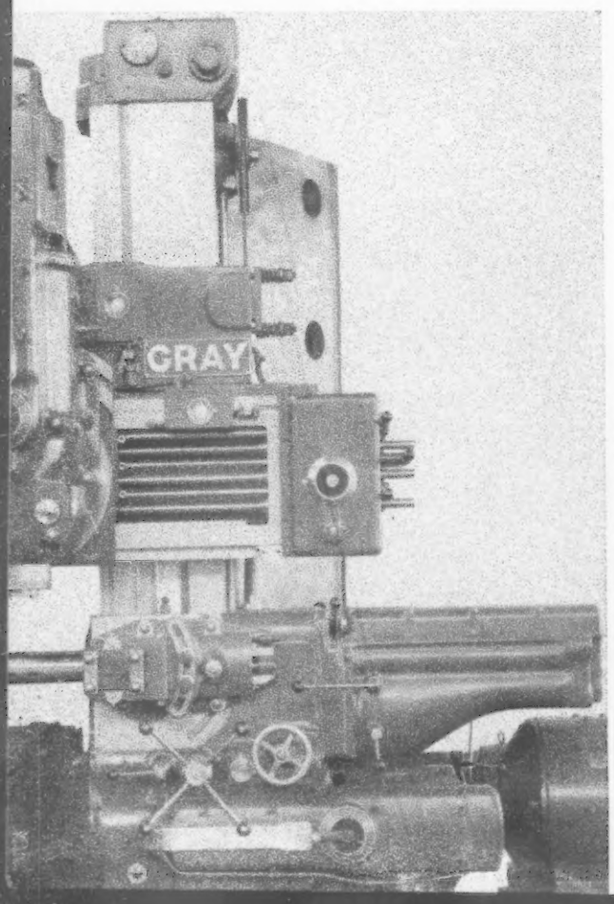
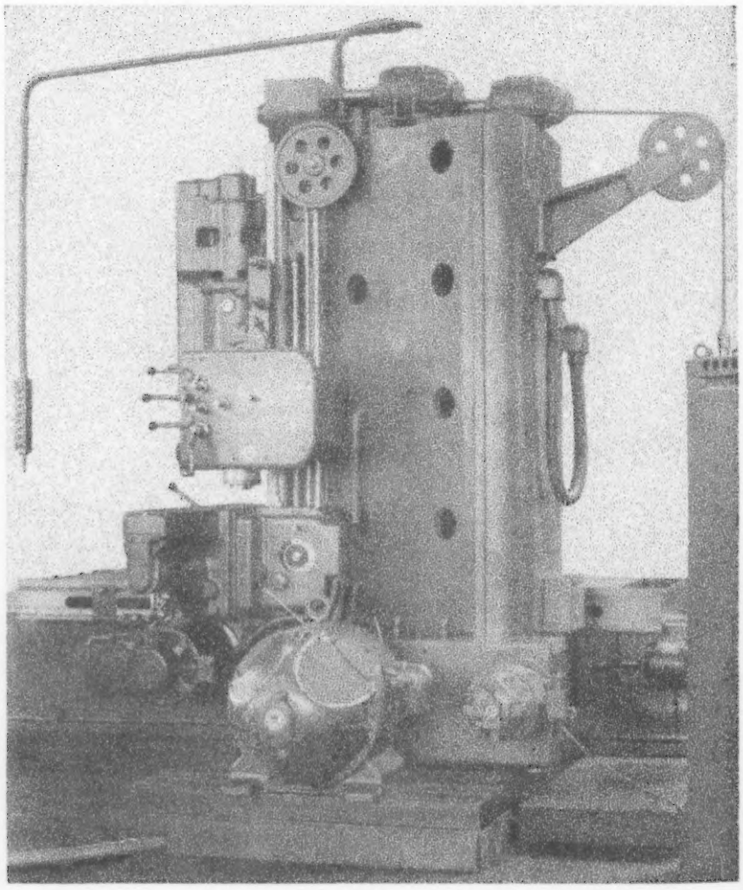
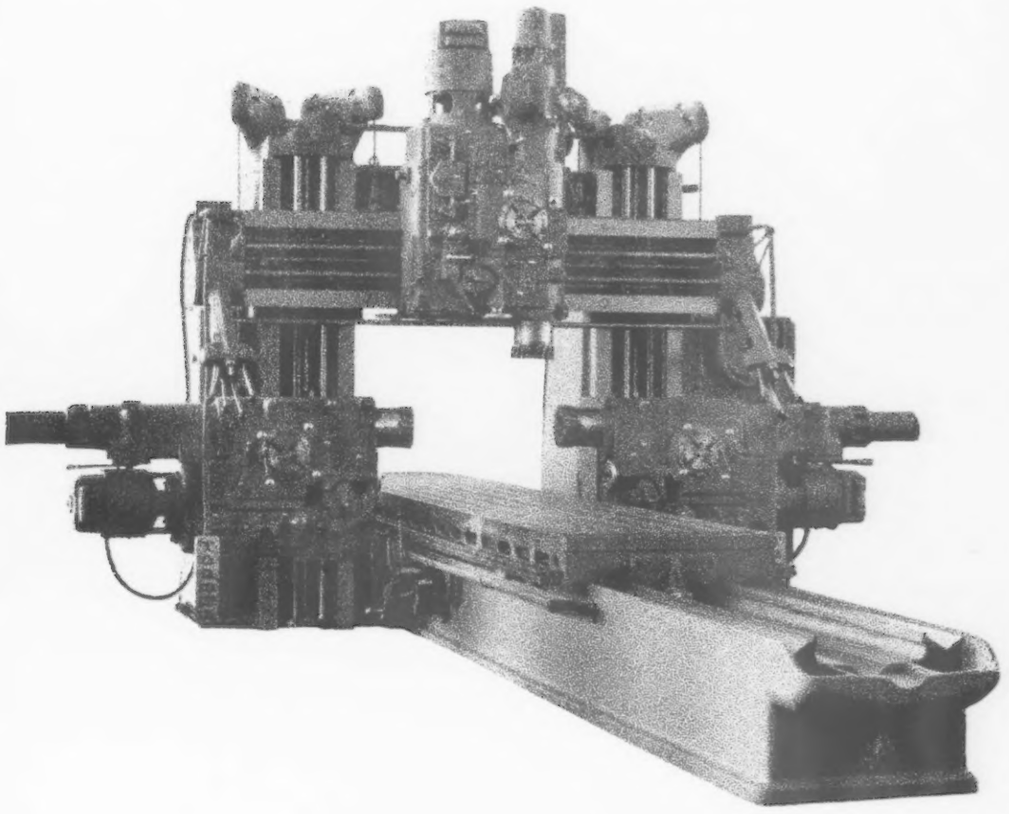
THE machine is designed to mill, plane, bore and drill, and a precision setting table may be had for operations on jigs and fixtures. Balanced helical gear table drive with gears in oil bath. (G. A. Gray Co.)







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GIDDINGS & LEWIS No. 340 - PQ - 3H Planer Type Special Boring, Drilling and Milling Machine is designed with headstocks of the quill type. Hand and power feeds are supplied to both spindle and quill.

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THIS machine is of unit construction throughout, has combination mechanical and electrical controls and directional control. Direct reading dials. (Giddings & Lewis Machine Tool Co.)

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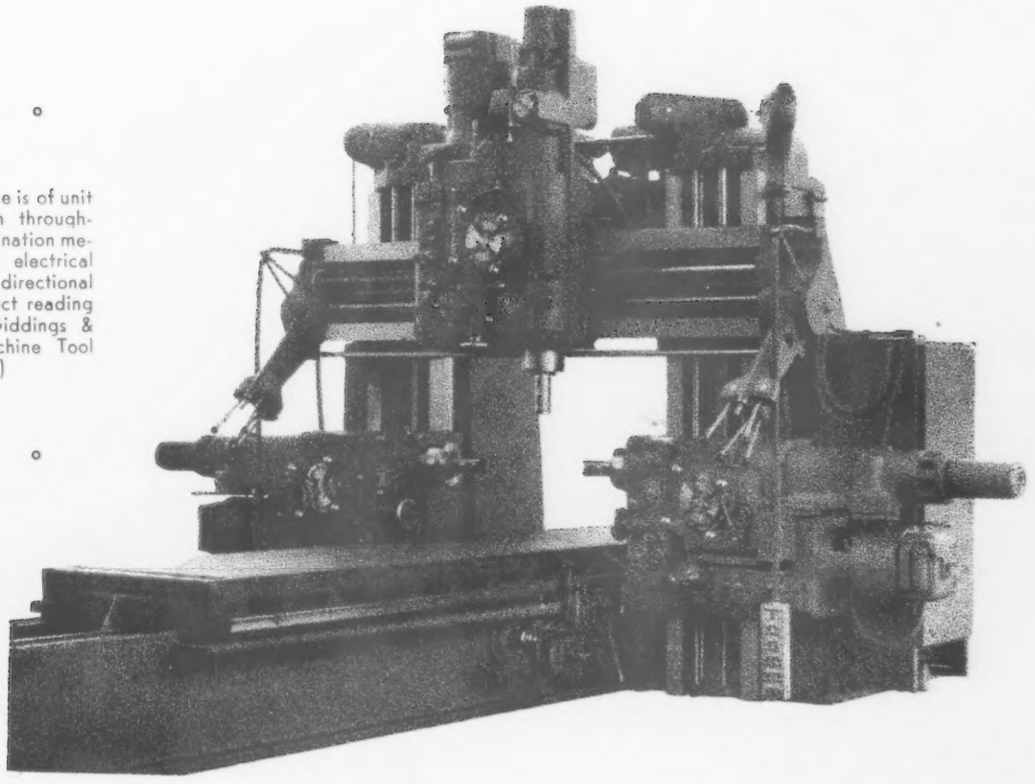
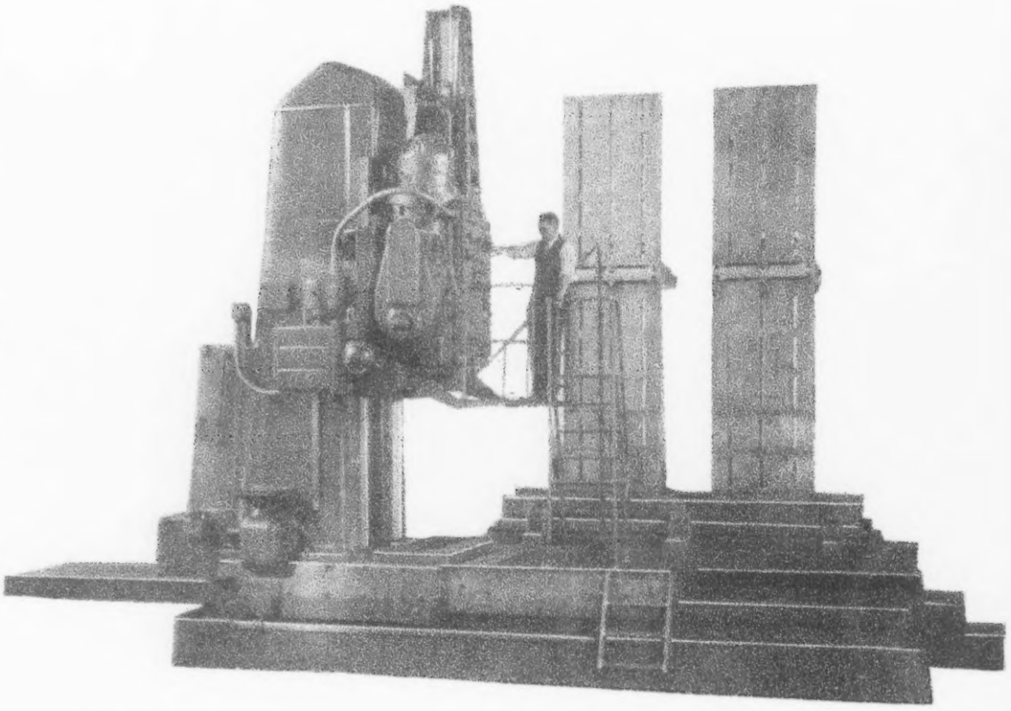
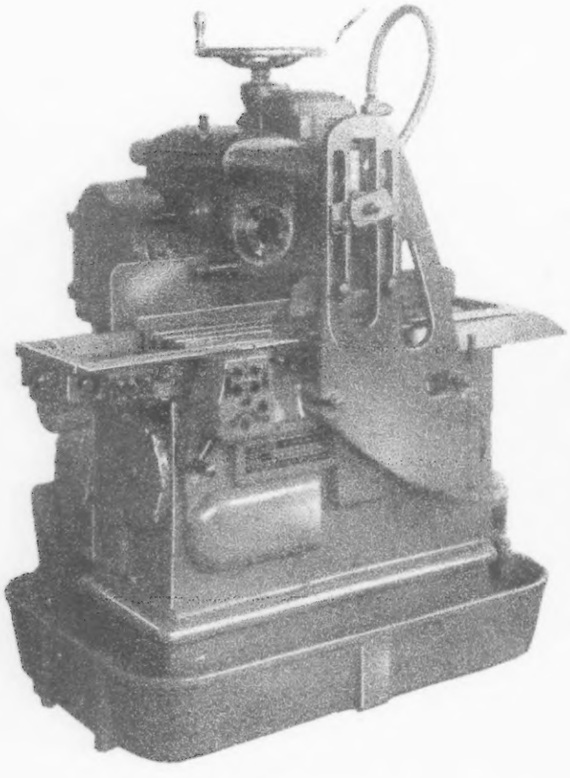


AT RIGHT

CUTTING a die impression 12 ft. long by 6 ft. high by 30 in. deep is within the capacity of this huge new Keller automatic tool room machine, which, with fixture, weighs 77 tons. The operator rides on the saddle. Trim appearance results from elimination of separate control cabinet, simplification of exterior wiring, harmonious design of gear boxes and other units. (Pratt & Whitney Co.)



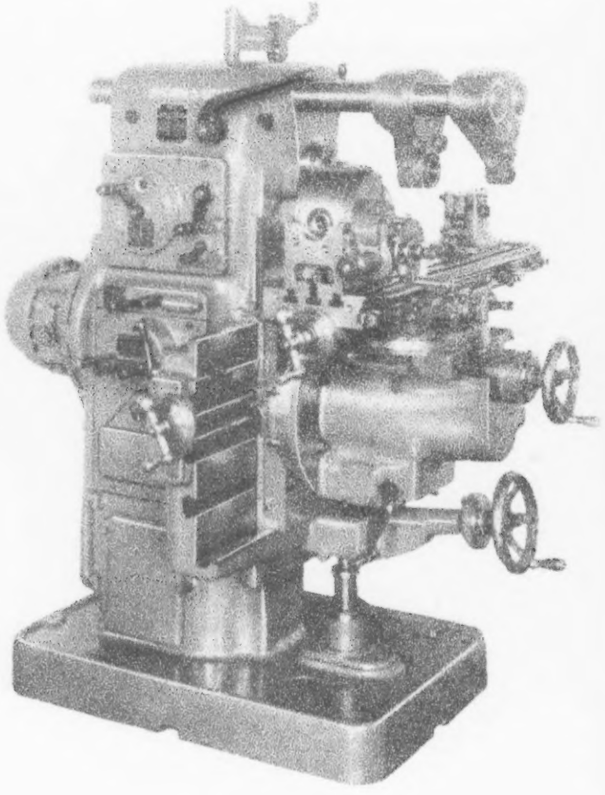


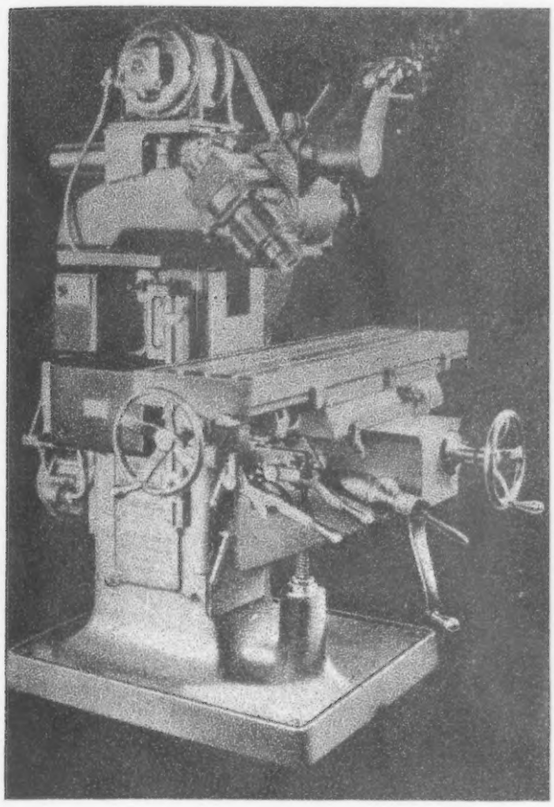
ABOVE

BROWN & SHARPE No. 12 Plain Milling Machine represents a radical departure in design, being operated through electrical control. Suitable for any type of production milling on medium-sized parts for long or short runs. Particularly adapted to form cutter milling in steel. Automatic lubrication. (Brown & Sharpe Mfg. Co.)

BELOW

BROWN & SHARPE Omniversal Milling Machine is unique in providing an easy and accurate method of obtaining simple and compound angular settings. It is designed primarily for tool room and experimental work but is also valuable on small runs in production not justifying elaborate fixtures. Positioning is facilitated by verniers reading to 2 min. of arc. (Brown & Sharpe Mfg. Co.)





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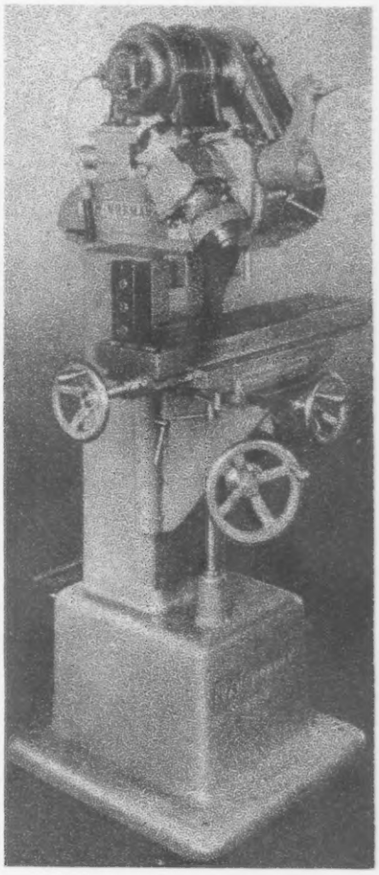
AT LEFT

VAN NORMAN No. 32 Universal Milling Machine has been designed for tool and pattern work and short run production. Power feeds in all directions. Retains the typical Van Norman swiveling cutter head. Ball bearing throughout. (Van Norman Machine Tool Co.)



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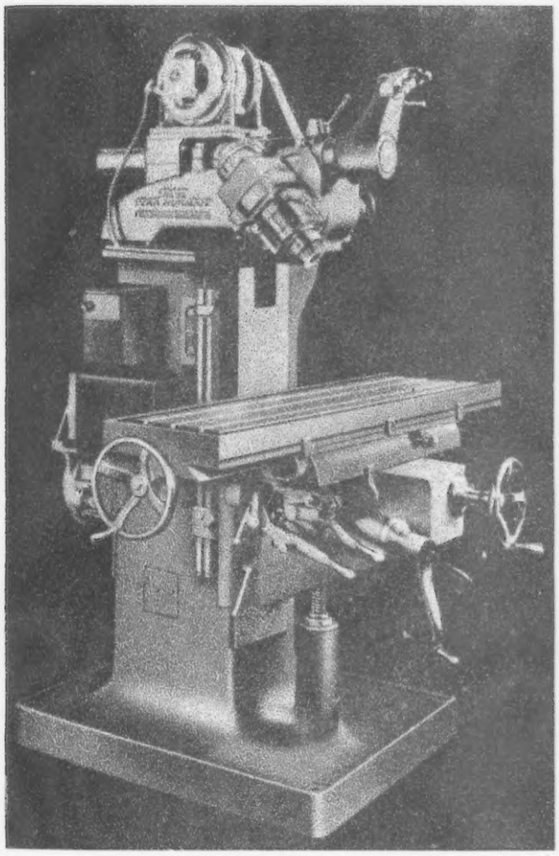

AT RIGHT AND BELOW

IN addition to the No. 32 Universal, the Van Norman Machine Tool Co. has produced three other new machines, each designed to be best adapted to a particular class of work. They are all adapted to mill horizontal, vertical and angular spaces throughout the entire table run. (Van Norman Machine Tool Co.)

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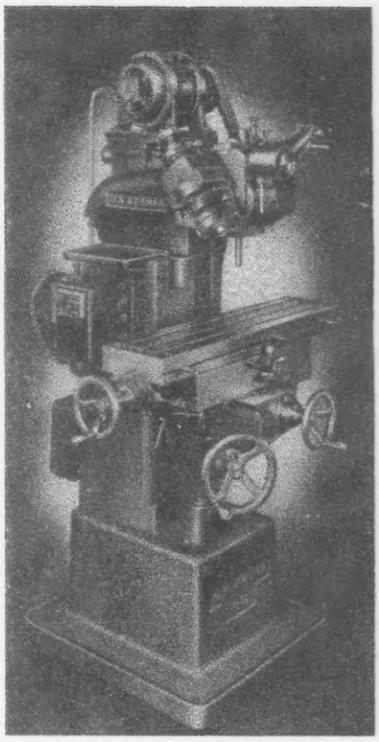
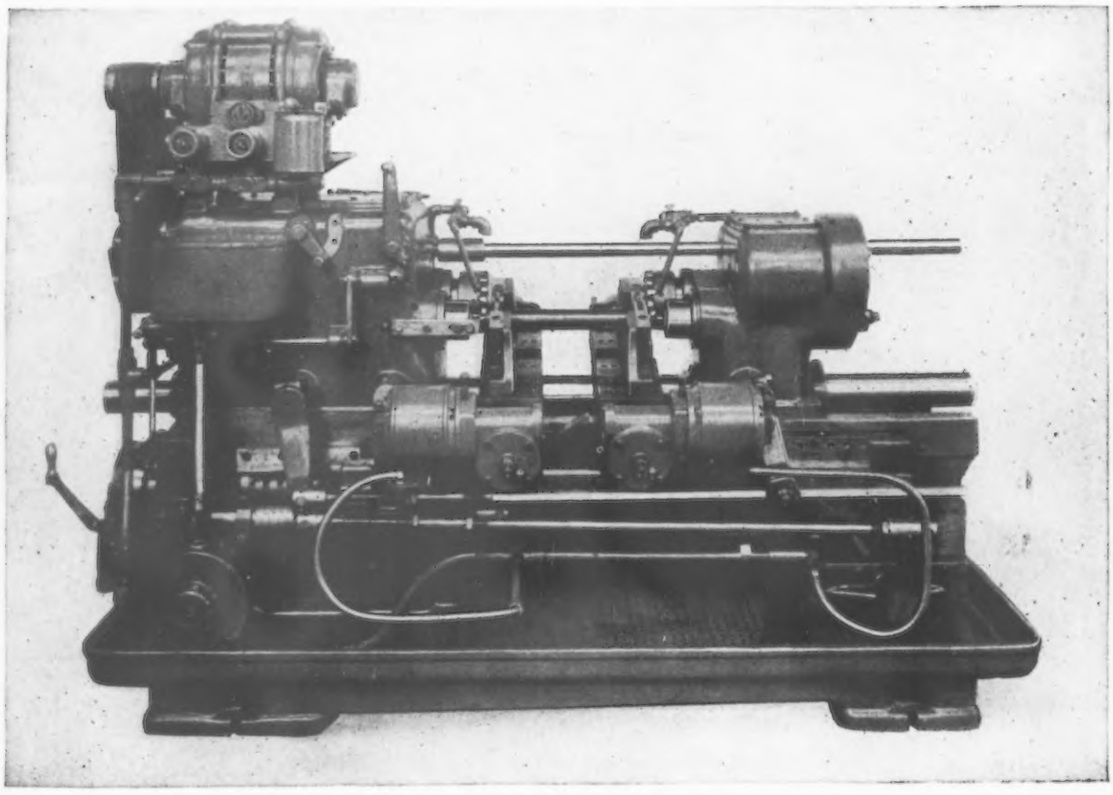


The J&L AUTOMATIC DOUBLE END



THIS machine mills to length and centers to uniform depth both ends of shafts and similar pieces preparatory for turning operations.

In all details the machine is built to modern standards of excellence.

Anti-friction bearings prevail throughout the design; shafts and gears are hardened and ground.

The machine operates as follows:
The work is located and chucked in V-blocks. The work-holding units rock in fast motion up to the milling cutters and both ends of the shaft are milled simultaneously to the required length. As soon as the milling cuts are completed the machine goes into fast motion, rocks the work to the centering position, and both ends are centered to uniform depth. The centers are then withdrawn in fast motion and the machine stops.

The machine has a single pulley drive through a multiple disc clutch mounted in the main drive pulley. It has a variable speed headstock arranged for three speed changes through sliding gears.

The right hand head is adjustable on the ways of the machine with a lead screw located on the back.

Milling and Centering Machine . . . . .

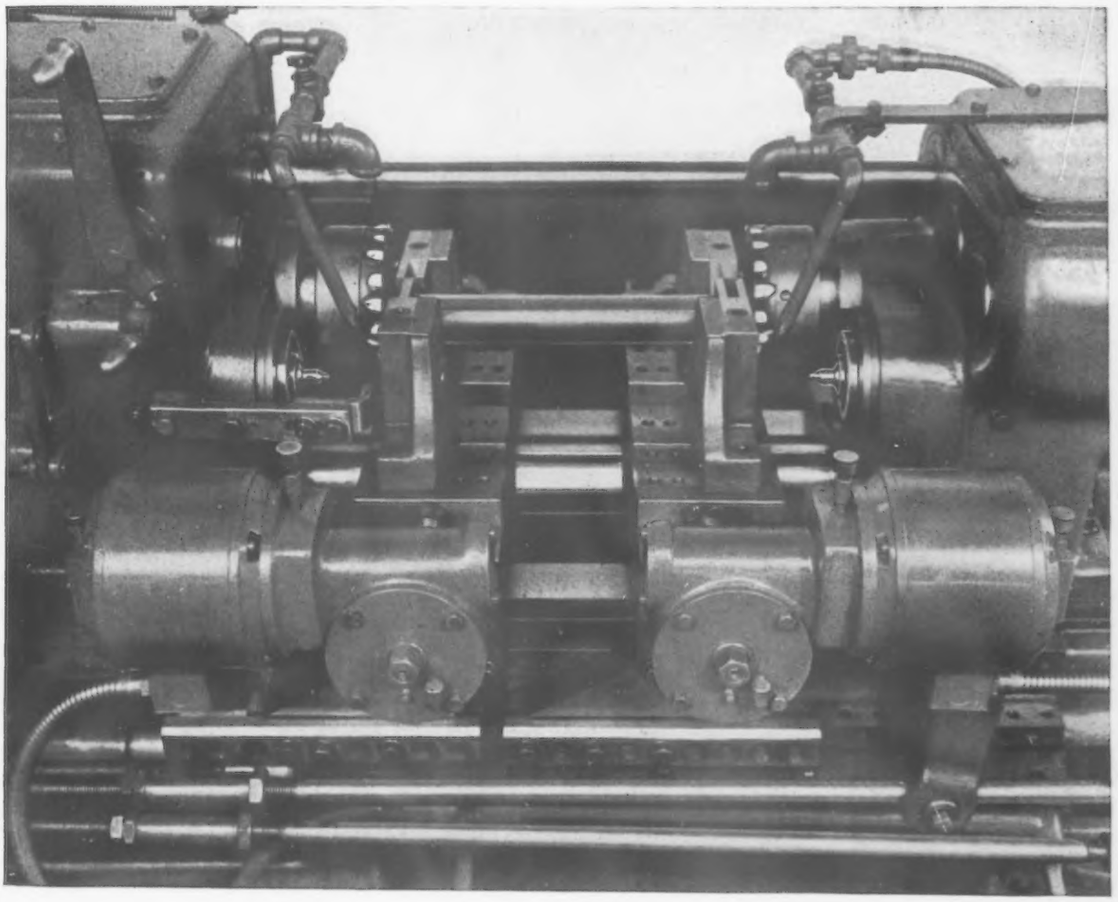
By loosening two clamp screws, the work supports can be moved on the center bar of the machine to suit various lengths of work.

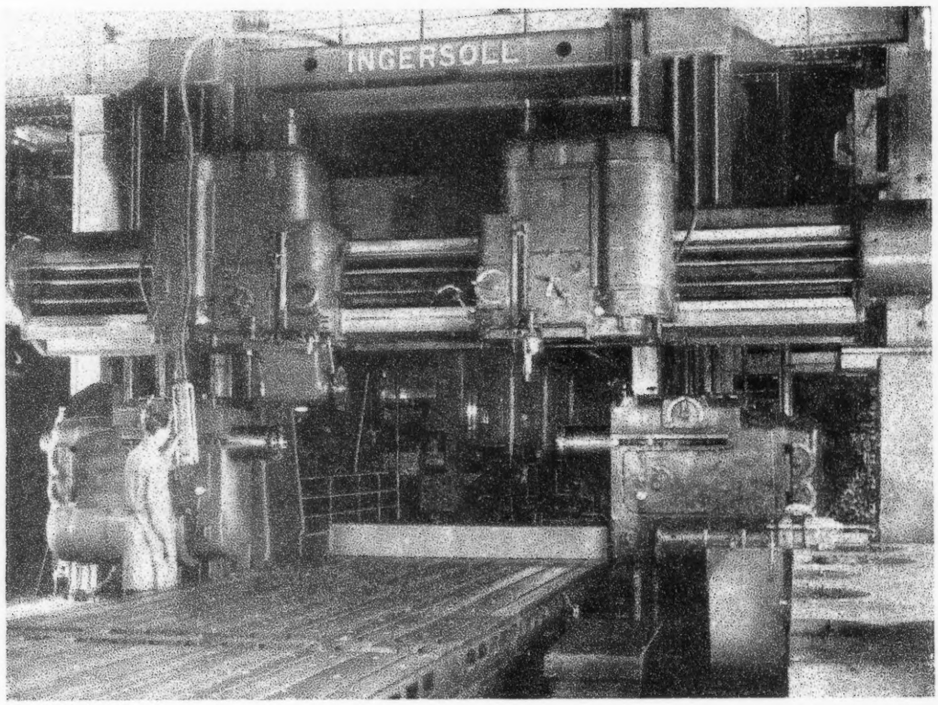
All movements of the machine are controlled by hardened cams on the outside of the cam drum, and the work-holding units are supported on hardened and ground former blocks.

The work is automatically chucked in hardened V-blocks operated by electric torque motors, or, if desired, hand operated chucks can be supplied.

The machine may be conveniently grouped with two turning machines so that one operator can run all three machines.

JONES & LAMSON MACHINE COMPANY, Springfield, Vt.





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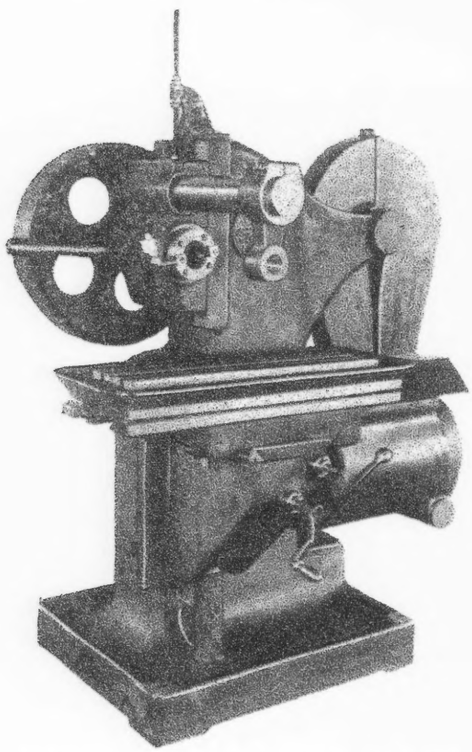
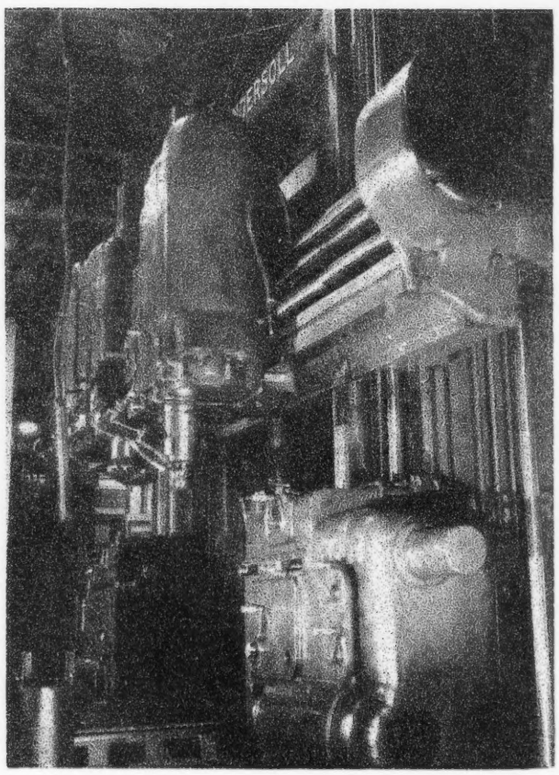
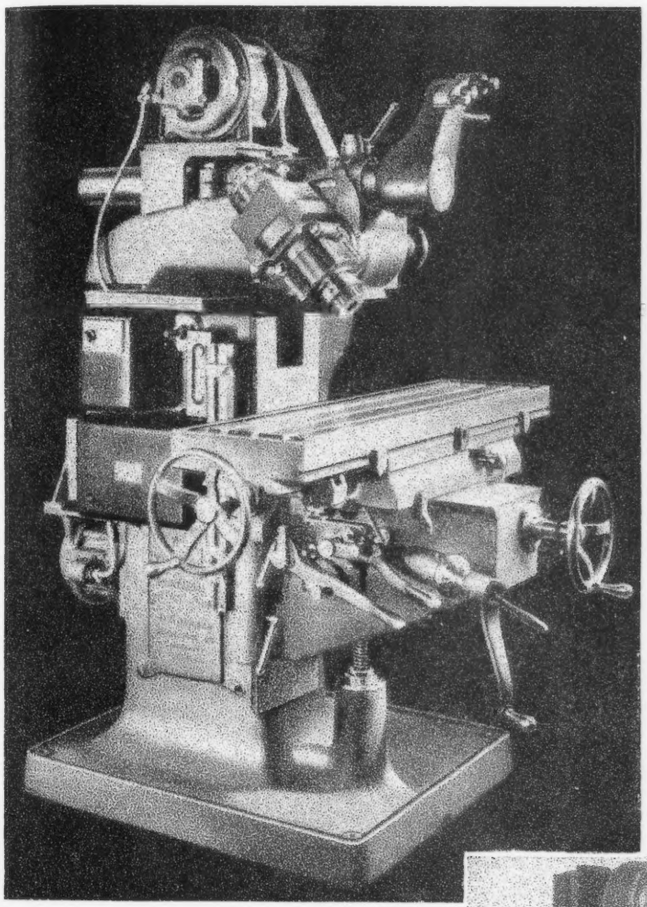
AT LEFT AND BELOW

INGERSOLL Four-Head Adjustable Rail Planer Type Milling Machine of unusual size has been recently completed. Distance between housings is 11 ft. 6 in. There is 10-ft. vertical clearance and the table length is 40 ft. It can machine five sides of a casting at one setting. (Ingersoll Milling Machine Co.)



CAM-CONTROLLED table feed of this No. 26 high-production miller permits any desired cycle of automatic table movement. The cam housing is integral with the slide on the knee. Special fixtures and special cutter arrangements widen adaptability. (Kent-Owens Machine Co.)





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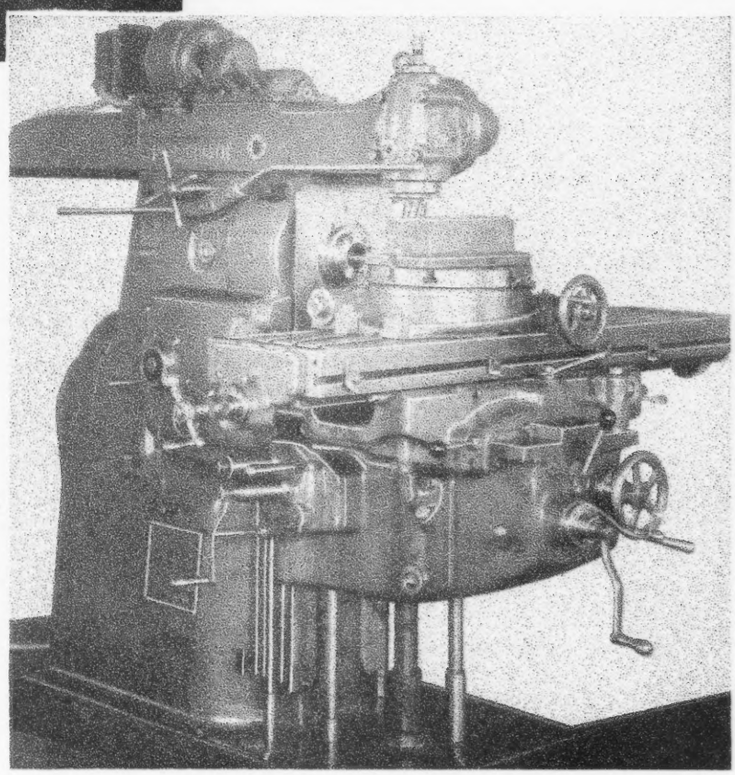
AT LEFT

VAN NORMAN No. 22 Universal Milling Machine has increased range and flexibility. It is designed to reduce machining costs because of elimination of many of the set-ups usually required. High spindle speeds and increased rigidity are salient features. (Van Norman Machine Tool Co.)

o o o

BELOW

MOTOR-DRIVEN universal milling attachment is a self-contained unit in the overarm, the overarm with attachment being substituted for the standard overarm. Attachment does not interfere with normal use of overarm and arbor support. An advantage is that work can be accurately milled on various surfaces with few set-ups. (Cincinnati Milling Machine & Cincinnati Grinders, Inc.)



Rebuild Prosperity with Improved Machinery

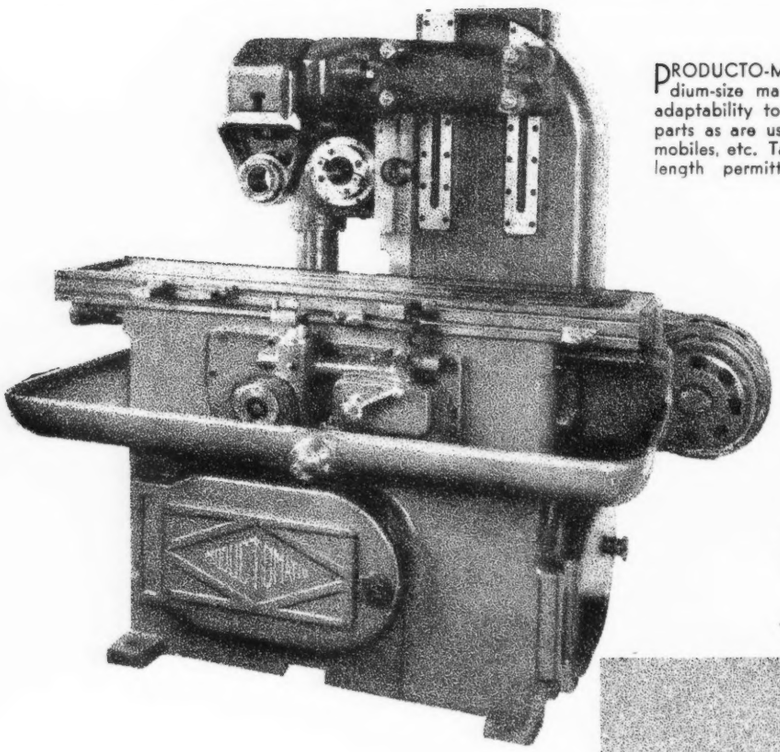
(CONTINUED FROM PAGE 23)

problem, too, and the Machine Age, in turn, will find another justification.

Domestic Equipment

Then there is the application of the machine to the relief of domestic drudgery. Much has already been accomplished in this direction, chiefly due to the efforts of the utility companies to build up a domestic power load.

Before very long, the machine will enter upon a huge expansion, not only in the homes but in the factories, where domestic electrical equipment is made. For these are ideal mass-production goods. The



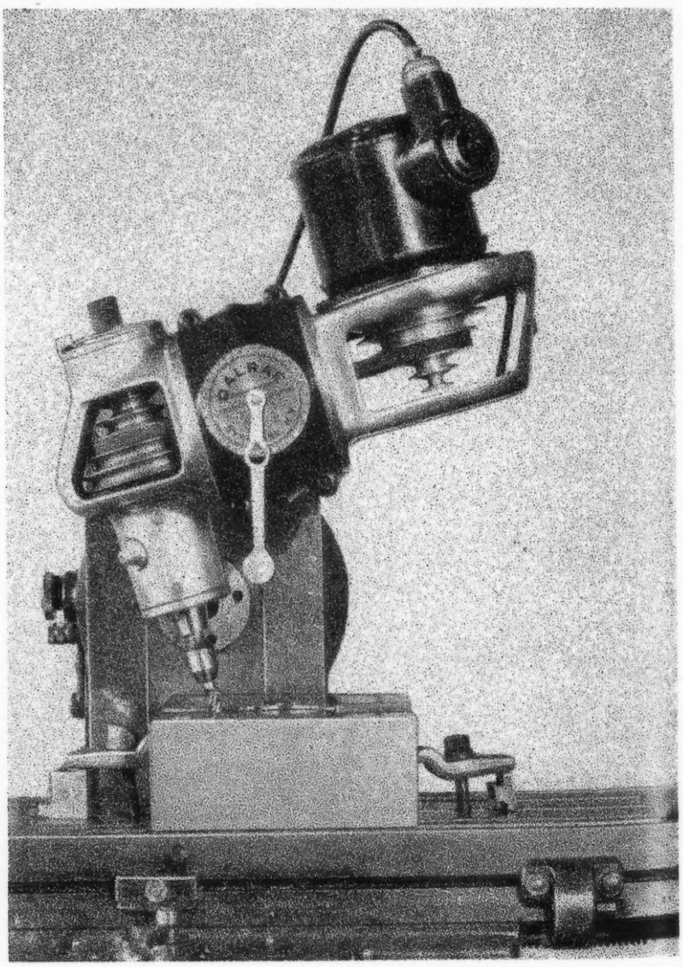
AT LEFT

PRODUCTO-MATIC No. 28 Milling Machine is a medium-size manufacturing machine designed for wider adaptability to miscellaneous milling operations on such parts as are used in typewriters, sewing machines, automobiles, etc. Table is supported practically over its entire length permitting rigidity on long cuts. (Producto Machine Co.)

o o o

BELOW

DALRAE Speedmill is a high-speed milling attachment for use on milling machines, horizontal boring machines and on special multiple-unit milling machines. It is designed to operate small end mills at proper speeds through belt drive, saving breakage due to under-speeding. (Dalrae Tool Co.)



more refrigerators, ranges, hot-water heaters, fans, toasters, percolators, irons, mixers, vacuum cleaners, air-conditioners, radio, dish and clothes washers and, perhaps, televisors, can be made, the lower the price.

Production of Men's Clothing

Thus the machine system of the future may be expected to replace the present haphazard and inefficient means of satisfying two primary human needs, food and shelter. Why should it not be extended to the third, clothing? Here again a beginning has been made, but there is still much to be done in the mechanization of an industry whose products everyone buys.

Singularly enough, the masculine mind of the engineer has been satisfied to concern itself with the mechanical production of the material for clothing. What is done with the yardage of thread, cloth and fabric and all the appurtenances of dress after their delivery to the fabricators of articles of

»

»

»

"...not to copy...but to contribute"

It was in the year 1899, shortly after Edward Kearney and Theodore Trecker had started in business, that a friend said to them, "You are just beginning . . . if you want to make a success of building milling machines —copy the products of your competitors."

Mr. Kearney replied, "We are not in business to copy — but to contribute."

It was this spirit that spurred Kearney & Trecker to develop the first all-geared milling machine, the world famous double overarm, the first automatic flooded lubrication—and scores of other engineering achievements that have advanced the practice of milling.

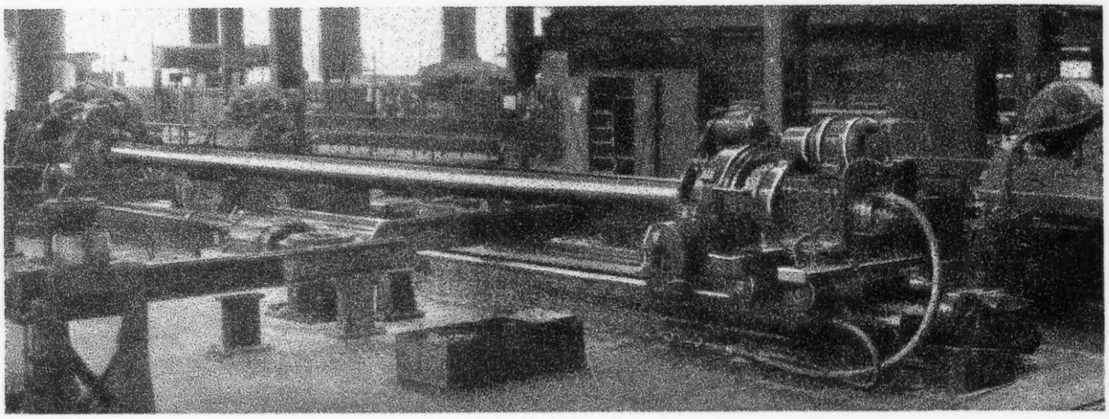
Recent developments include the introduction of higher spindle speeds, the super-precision Hypoid bevel gear dividing head, and the successful application of Tungsten and Tantalum Carbide to production milling.

At Cleveland we will exhibit a complete new line of Milwaukee Milling Machines — machines which mark another milestone in engineering progress — another contribution to faster and more efficient milling.

SPECIALISTS IN ONE LINE OF PRODUCTS—MILWAUKEE MILLING MACHINES

KEARNEY & TRECKER CORPORATION

More than thirty-six years of doing one thing well!



BOTH ends of large oil well casing pipe are thread-milled simultaneously on this machine, believed to be the largest pipe threader ever built. Capacity of the machine, which weighs 70,000 lb. and employs seven motors, is for pipe 4¾ to 16 in. in diameter, 20 to 41 ft. in length. (Lees-Bradner Co.)

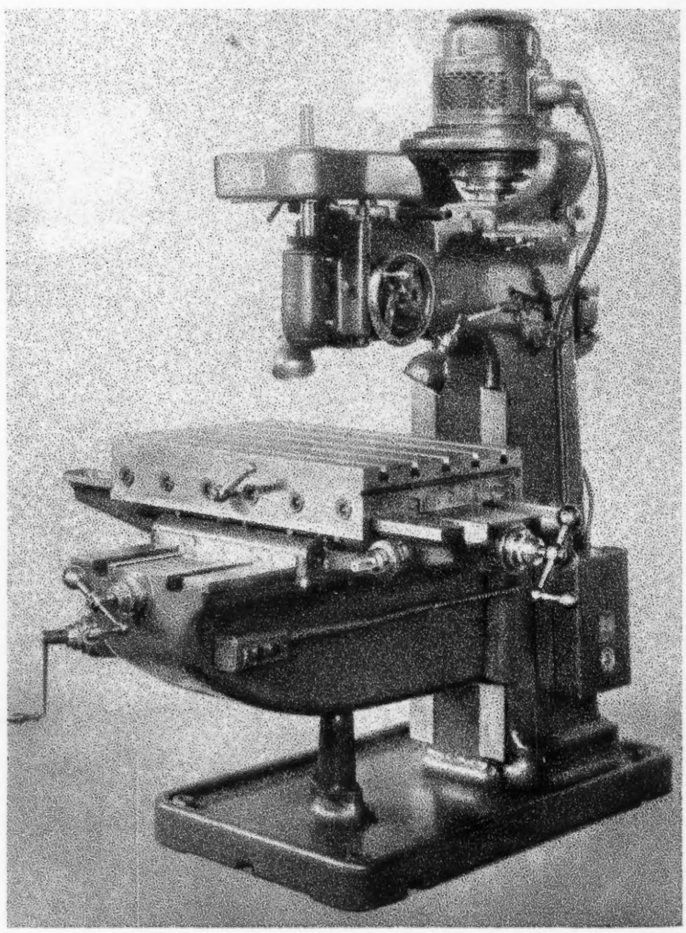
wearing apparel seems to have concerned the inventors and promotors of machines very little. Somewhat snobbishly, they have left the rest of the operation of manufacturing clothes (which costs the consumer almost exactly as much as the material) to the humble tailor, the sweatshop operator or the dressmaker.

Perhaps the production engineer, in his hours off duty, may have been casually impressed by the fact that his women-folk are able to buy a whole summer's wardrobe for the price of one of his business suits. Attractive frocks are displayed in the show windows of small retailers at three or four dollars, a jaunty hat at a dollar. After deducting the retail profit, cost of distribution and other overhead, that represents an inevitably low manufacturing cost.

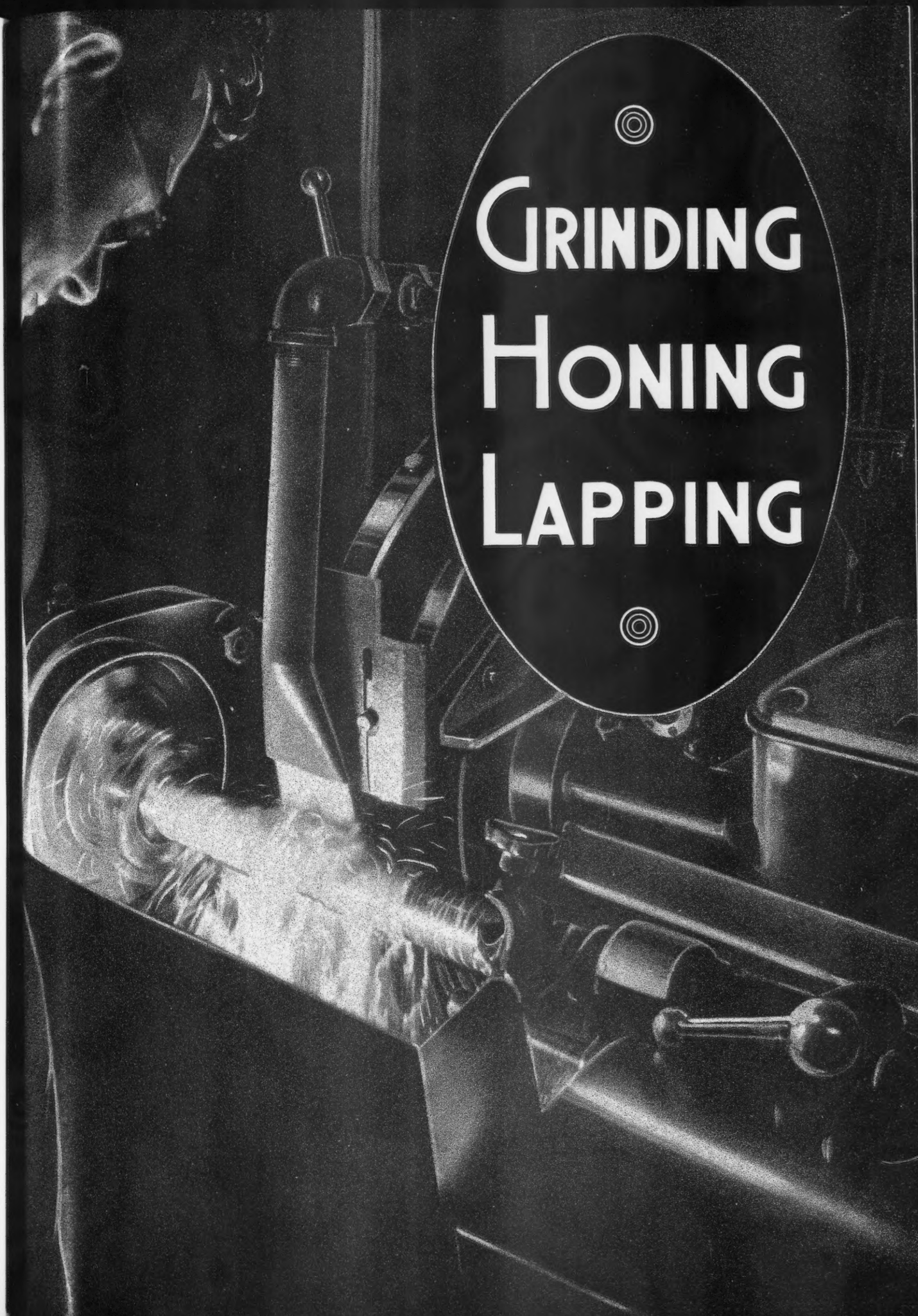
The same applies to other women's garments, coats, suits, shoes, stockings, underwear. Yet the same engineer goes on paying $50, more or less, for a suit or an overcoat, $5 for a hat and $2 for a cravat.

The answer is that the machine has been applied intensively to the production of ladies' and children's wear and very little, if at all, to that of the supposedly stronger sex. Perhaps their ortho-

(CONTINUED ON PAGE 118)



VERTICAL Miller and Die Sinker for rubber mold and metal pattern work. Both longitudinal and cross-feed screws have adjusting nuts. Table and saddle, mounted on roller bearings, are carried in eccentric holders to provide for proper adjustment. Ten spindle speeds, from 400 to 2600 r.p.m., are available. Underside of throat accommodates lamp in addition to bracket lamp shown. (Reed Prentice Corpn.)


GRINDING
HONING
LAPPING

See it done at Cleveland Booth № 906

Successful surface grinding requires the right table speed for each job. The new Pratt & Whitney Hydraulic Surface Grinder has table speeds ranging from zero to 100 feet a minute. It provides the right speed *for any material.*

SURFACE GRINDING at 100 feet a minute!

WATCH this grinding demonstration in Cleveland. You will see a single lever vary the table speed like magic from zero all the way up to 100 feet a minute. Any speed between those limits can be produced instantly and smoothly. That is why this new hydraulic grinder can be kept at exactly the right speed for roughing or finishing any job.

These greatly increased table speeds make practical many jobs that never have been ground successfully before. This is particularly true of very thin work. Moreover, the higher speeds mean harder wheels and lower wheel costs.

See this new grinder at work, and find out the savings it will make in your shop. This year, more than ever before, modern equipment is needed to meet competition and make a profit. Surface grinding already has replaced many slower machining operations.

At our Booth—No. 906 in Cleveland—expert grinder men will be on hand to give you all the facts and figures to prove the economy of this new P&W 14-inch Hydraulic Vertical Surface Grinder. Don't fail to witness this demonstration and obtain the *facts*.

PRATT & WHITNEY CO.

HARTFORD, CONN.

AT RIGHT

HEALD No. 72-a Gap Internal Grinder is designed for gears, plates, connecting rods, housings, etc., with medium size holes but large work swings. Hydraulic control and quick acting truing device. (Heald Machine Co.)

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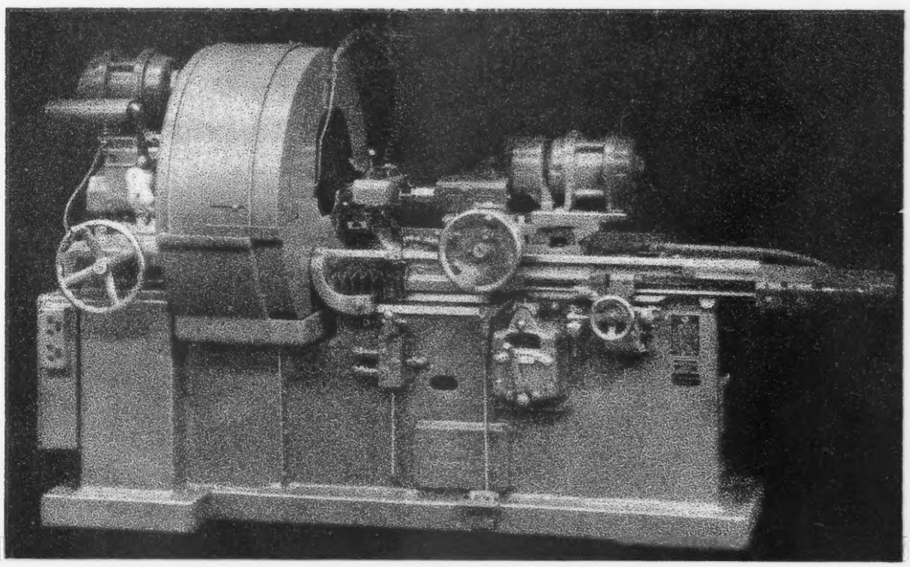
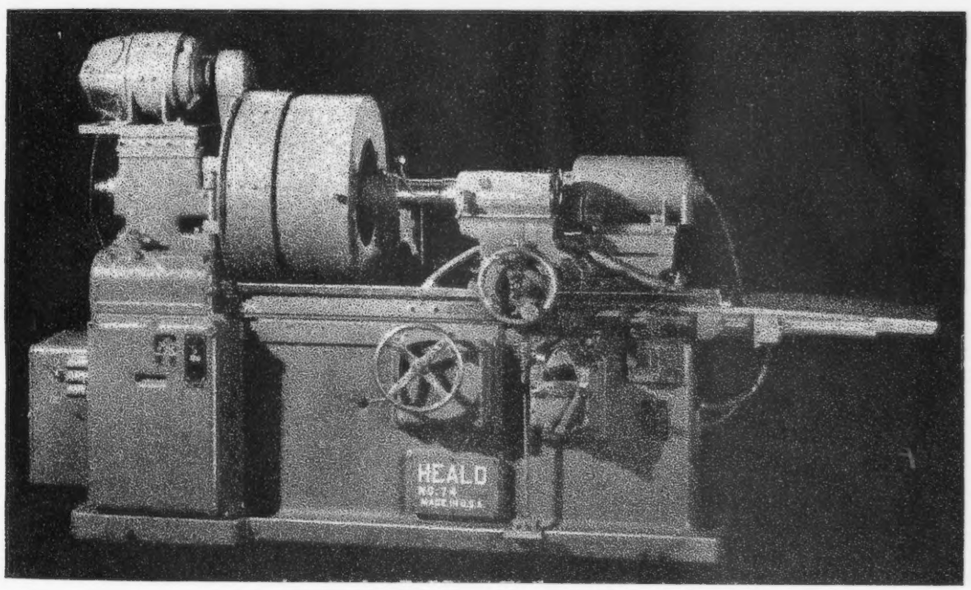
BELOW

HEALD No. 74 Internal Grinder is similar to previous No. 72, but is heavier and has larger capacity. Hydraulic table operation gives unlimited speed range between minimum and maximum. (Heald Machine Co.)





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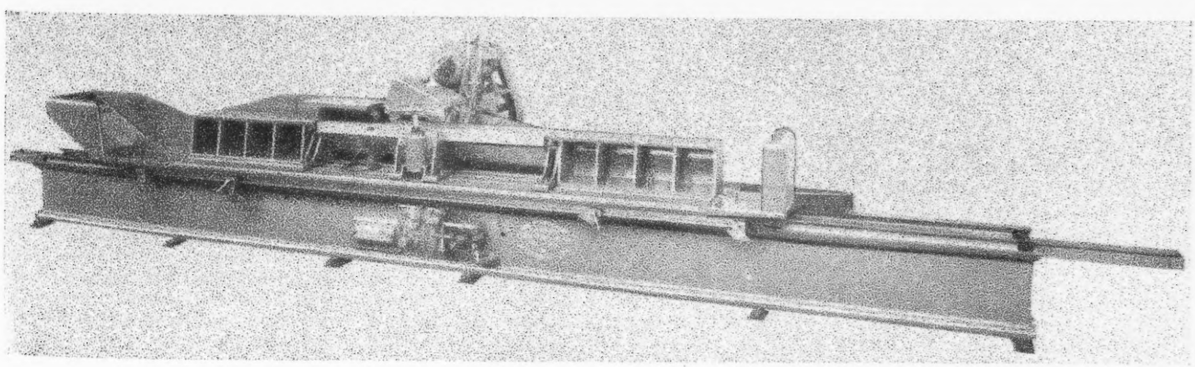
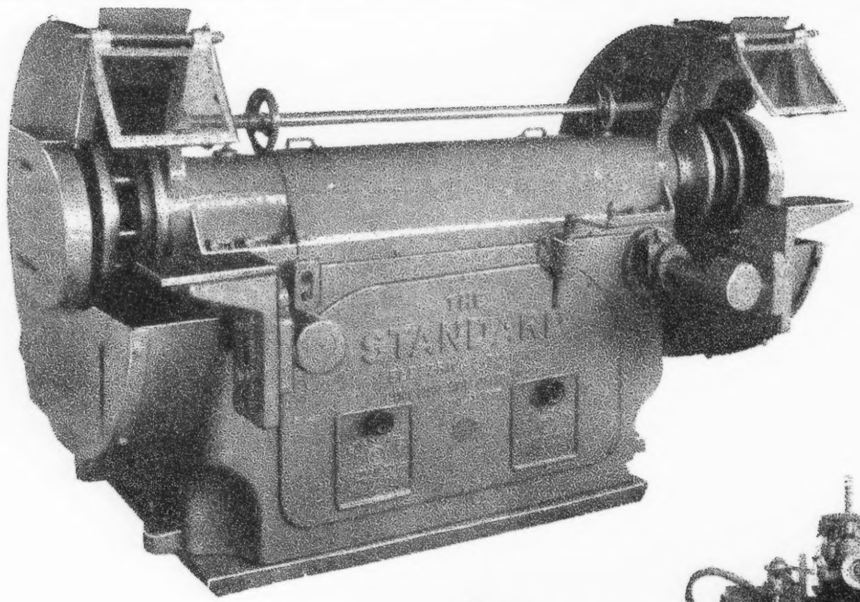
BELOW

BRIDGEPORT Type 75 Heavy-Duty Face and Shear Blade Grinder is equipped with vee and flat ways, forced feed lubrication, improved holding fixtures, including magnetic chuck for flying shears and bevel knives. (Bridgeport Safety Emery Wheel Co.)





AT LEFT

STANDARD Electrical High-Speed Snagging Grinder is made in three sizes to carry 20 in., 24 in. and 30-in. wheels from 2-in. to 4-in. face. Three speeds and sliding coupling on grinding wheel shaft facilitating belt changes. (Standard Electrical Tool Co.)

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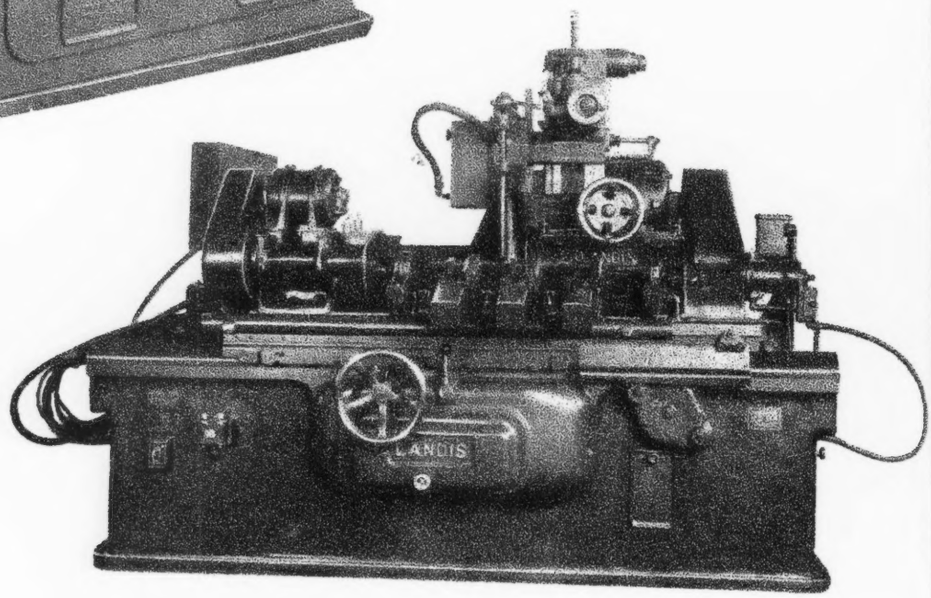

AT RIGHT

LANDIS 10-in. Type C Semi-Automatic Hydraulic Grinder is especially intended for grinding multi-diameter shafts at one set-up.

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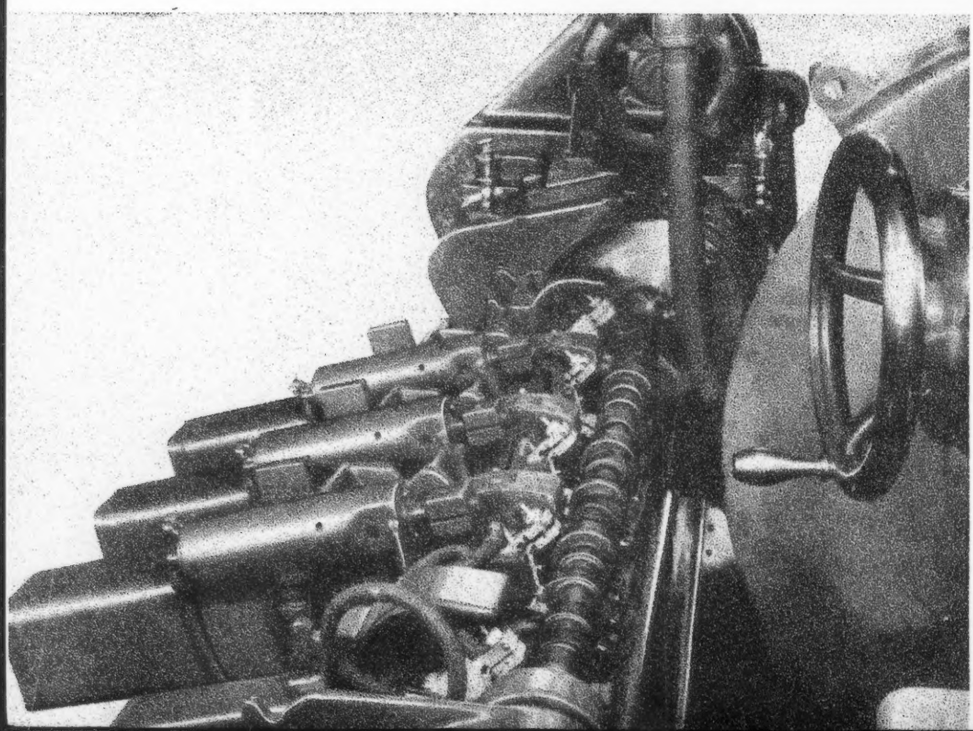

AT LEFT

IN the Landis Type C, sizing device controls wheel feed-in for rapid traverse, roughing and finishing. Automatic table positioning. Hydraulically operated wheel truer. (Landis Tool Co.)

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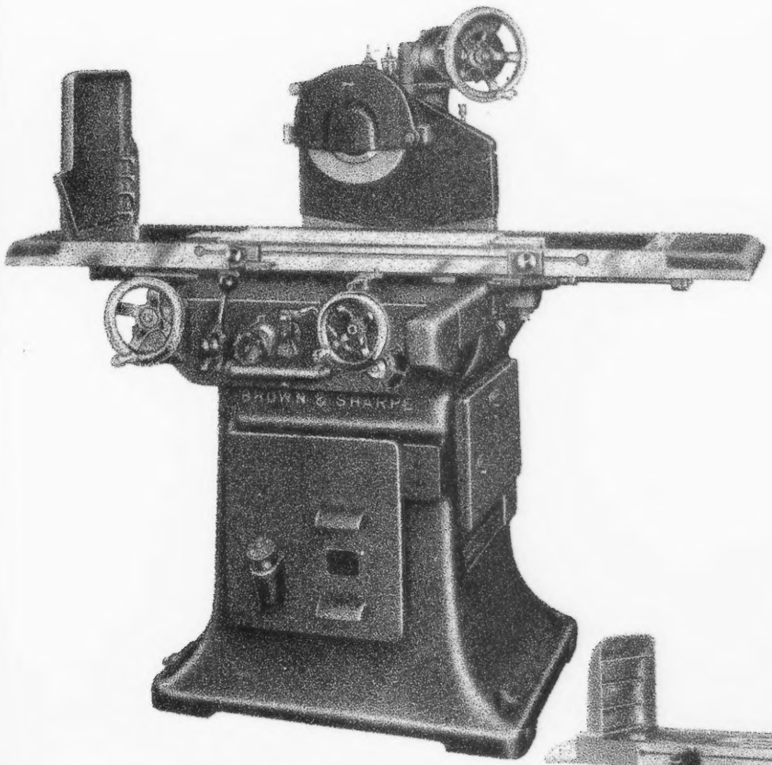


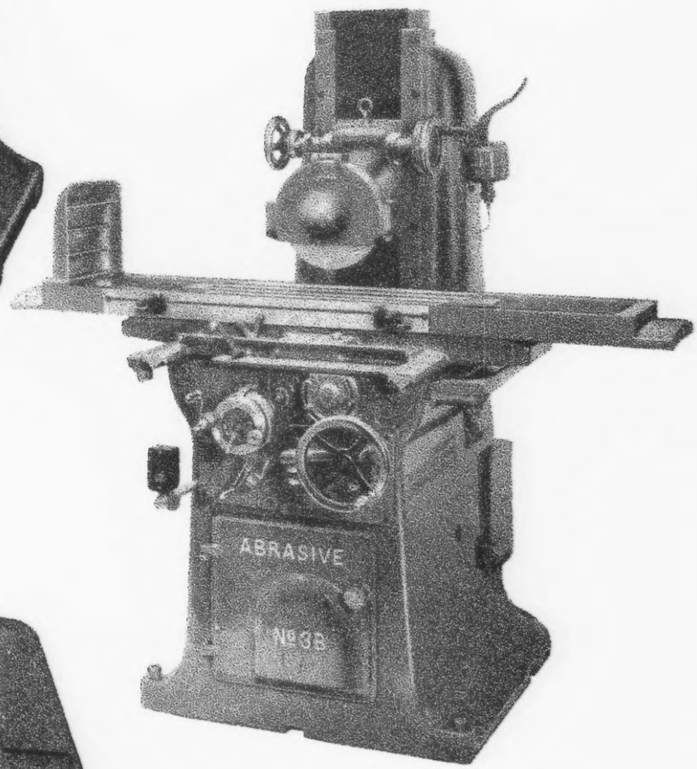
ABOVE

BROWN & SHARPE No. 5 Hydraulic Type Surface Grinding Machine is a new and exceptionally rugged design for both tool room work and manufacturing. Table is hydraulically powered and has any rate of longitudinal feed up to 60 ft. per minute. Grinds work to 24 in. long, 8 in. wide and 11 in. high. (Brown & Sharpe Mfg. Co.)

o o o

BELOW

ABRASIVE No. 3-b Surface Grinder is a more precise, vibrationless machine for the most accurate work. It has a one-piece bed casting, two-speed table transmission, an extra-heavy cartridge type spindle and a built-in oil operated shock absorber to remove shock of table reversal. (Abrasive Machine Tool Co.)



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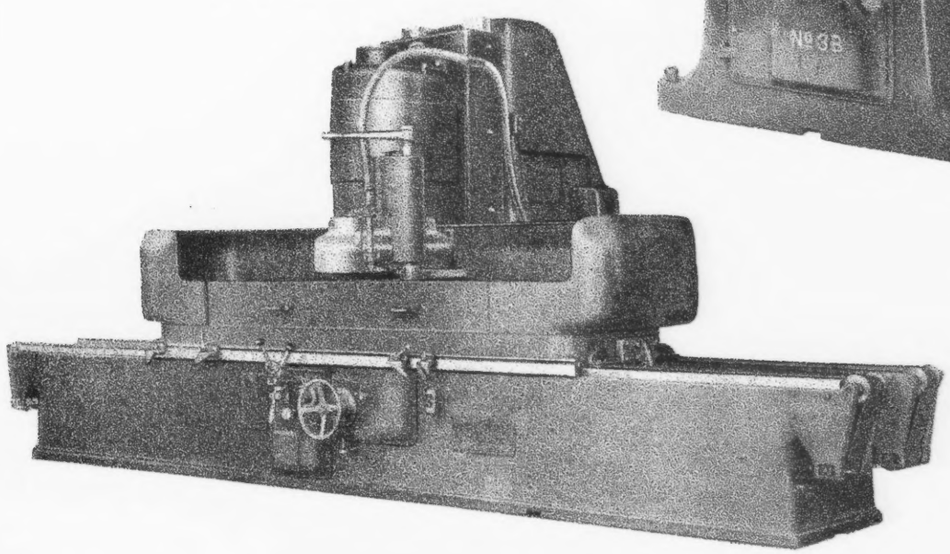


AT LEFT

HANCHETT No. 486 Vertical Spindle Face Grinder is a new design with hydraulically operated reciprocating table having speeds to 90 ft. per min. Wheel feed is both hand and automatic and there is a separate power unit for vertical movement of wheel head. Lubrication is automatic. (Hanchett Mfg. Co.)

PIONEERING BEYOND INDUSTRY'S HORIZON

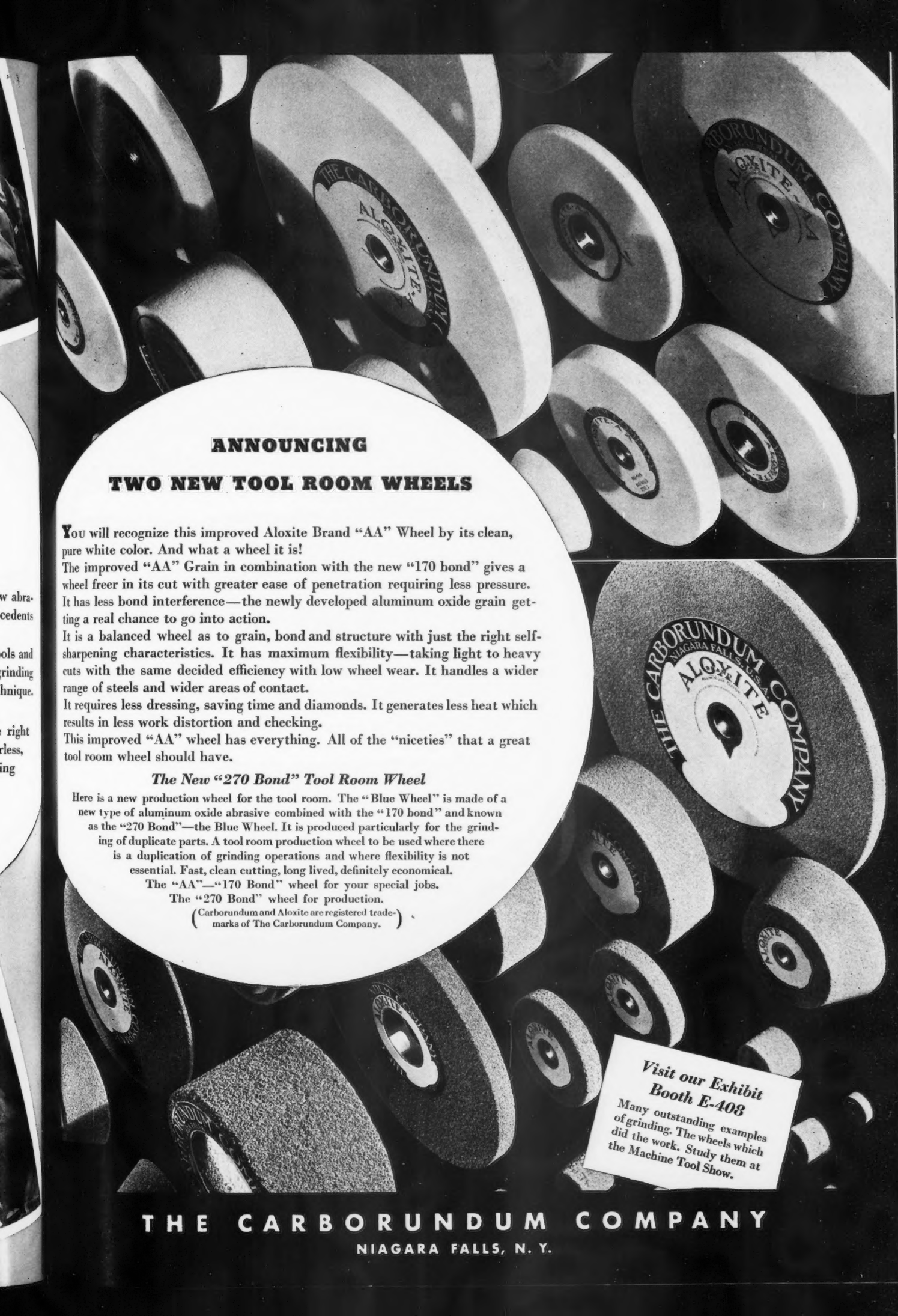
The Carborundum Company realizes its responsibility to the machine tool industry

THE constant aim of the organization is to develop and investigate new abrasive materials—new combinations of bond and abrasive—to set new precedents for productive performance. This is termed Research.

A new grinding machine, a new steel, iron or alloy is produced—new tools and parts come into being over night—their introduction presents new grinding problems calling for a new series of grinding wheels—a new grinding technique. Carborundum must be ready ahead of time.

Carborundum engineering service must put the right wheel in the right place for every grinding job from hair split precision of centerless, cylindrical, internal and tool room work to the heavy snagging jobs of the foundry.

Carborundum engineering facilities are available to the machine tool builder, the metallurgist—to all who are pioneering beyond present horizons.



ANNOUNCING

TWO NEW TOOL ROOM WHEELS

You will recognize this improved Aloxite Brand "AA" Wheel by its clean, pure white color. And what a wheel it is!

The improved "AA" Grain in combination with the new "170 bond" gives a wheel freer in its cut with greater ease of penetration requiring less pressure. It has less bond interference—the newly developed aluminum oxide grain getting a real chance to go into action.

It is a balanced wheel as to grain, bond and structure with just the right self-sharpening characteristics. It has maximum flexibility—taking light to heavy cuts with the same decided efficiency with low wheel wear. It handles a wider range of steels and wider areas of contact.

It requires less dressing, saving time and diamonds. It generates less heat which results in less work distortion and checking.

This improved "AA" wheel has everything. All of the "niceties" that a great tool room wheel should have.

The New "270 Bond" Tool Room Wheel

Here is a new production wheel for the tool room. The "Blue Wheel" is made of a new type of aluminum oxide abrasive combined with the "170 bond" and known as the "270 Bond"—the Blue Wheel. It is produced particularly for the grinding of duplicate parts. A tool room production wheel to be used where there is a duplication of grinding operations and where flexibility is not essential. Fast, clean cutting, long lived, definitely economical.

The "AA"—"170 Bond" wheel for your special jobs.

The "270 Bond" wheel for production.

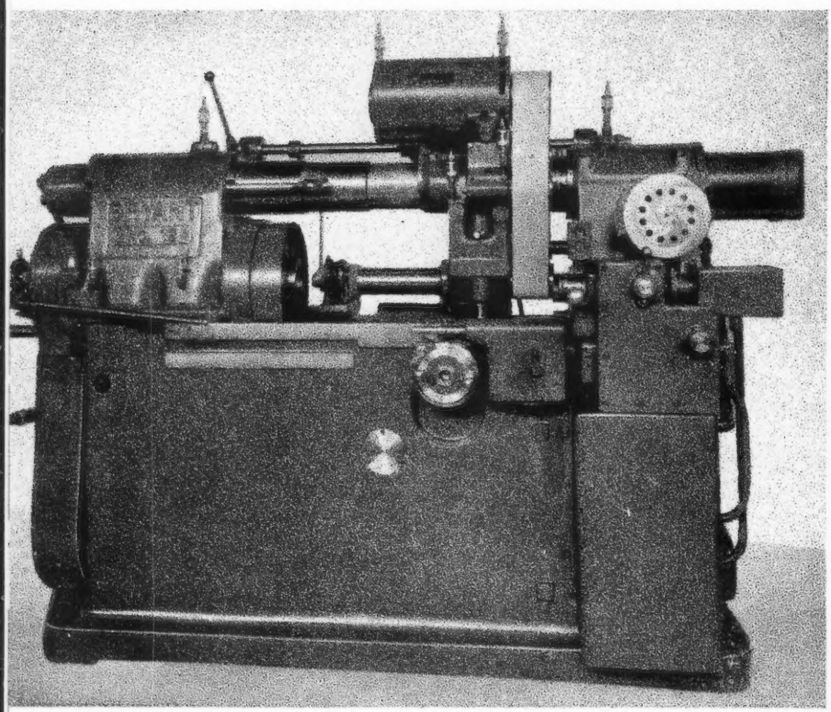
(Carborundum and Aloxite are registered trademarks of The Carborundum Company.)

Visit our Exhibit Booth E-403

Many outstanding examples of grinding. The wheels which did the work. Study them at the Machine Tool Show.

THE CARBORUNDUM COMPANY

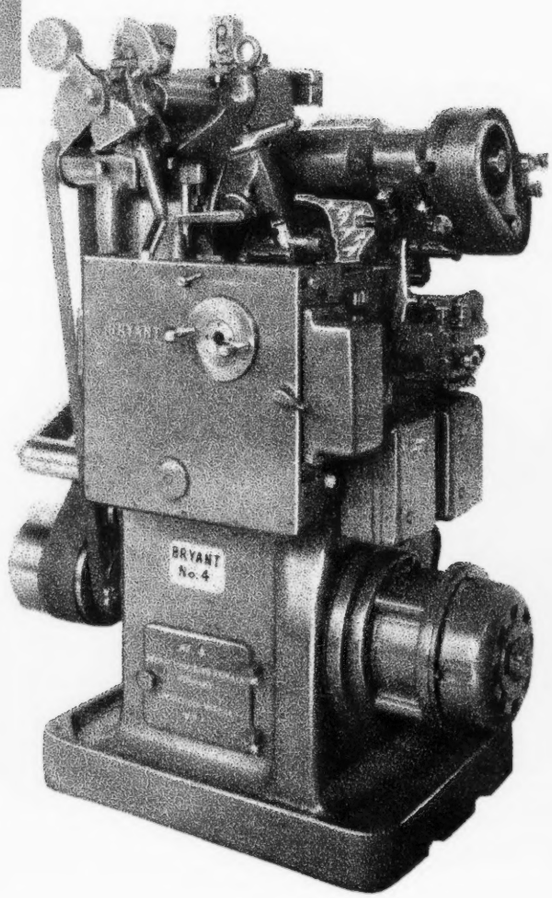
NIAGARA FALLS, N. Y.



o o o

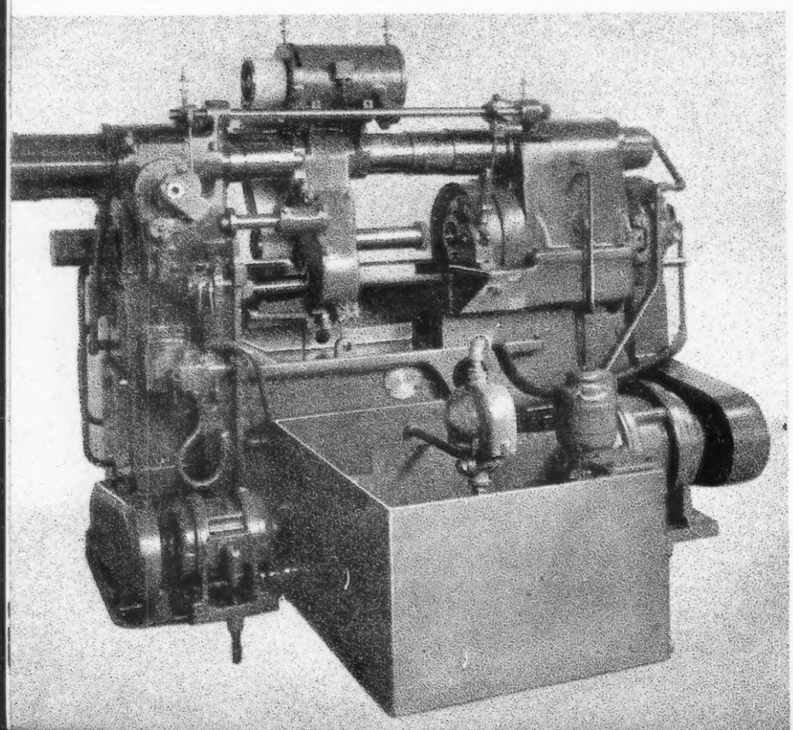
BELOW

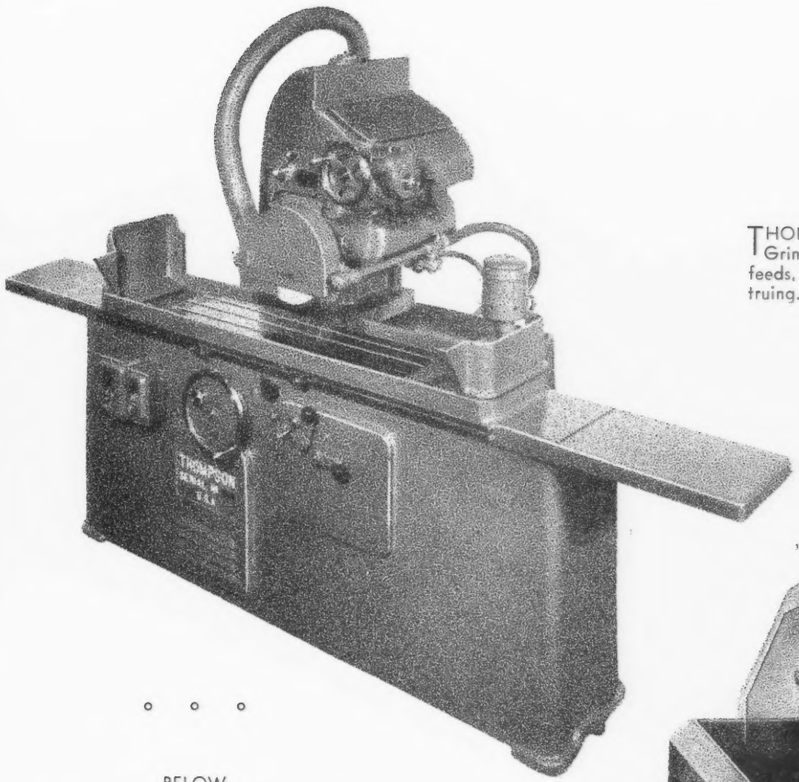
BRYANT No. 4 Automatic Grinder is especially designed for high production of small bores. It has 6½-in. diameter chuck swing and 3¾-in. maximum wheel slide traverse. Automatic sizing for blind, taper and straight holes. (Bryant Chucking Grinder Co.)



ABOVE AND BELOW

BRYANT No. 16 Hydraulic Grinder is a new design which has a capacity of 16 in. It is designed primarily for grinding holes up to 8 in. in length but can handle occasional work up to 14 in. Hydraulic control of traverse, wheel truing and positioning wheel slide. (Bryant Chucking Grinder Co.)





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THOMPSON Model B Special Hydraulic Surface Grinder has hydraulic control for wheel head feeds, rapid traverse and hydraulic automatic wheel truing. Power unit is mounted on rubber. (Thompson Grinder Co.)

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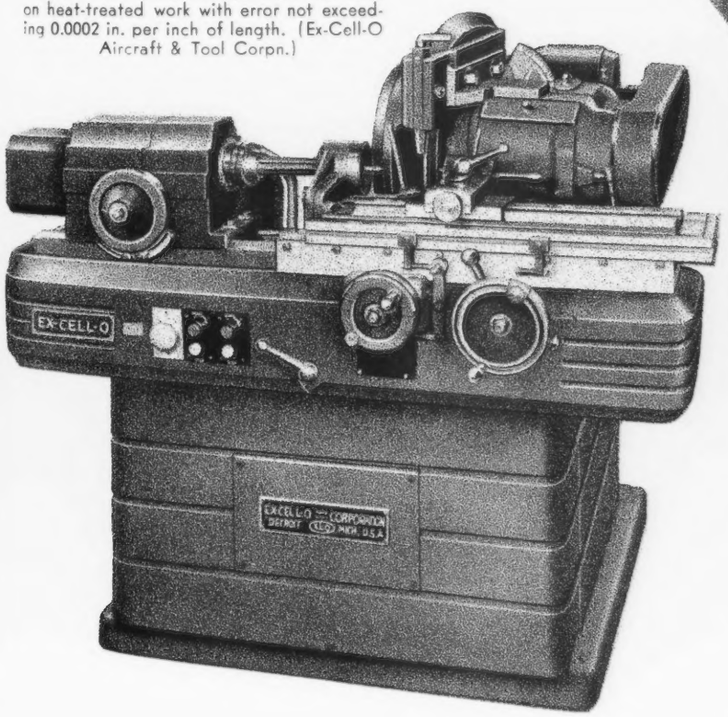
o o o

BELOW

EX-CELL-O Precision Thread Grinder is self-contained motor driven grinding machine designed for grinding right or left hand threads on screws, taps, chasers and worms. Will grind threads from the solid on heat-treated work with error not exceeding 0.0002 in. per inch of length. (Ex-Cell-O Aircraft & Tool Corpn.)

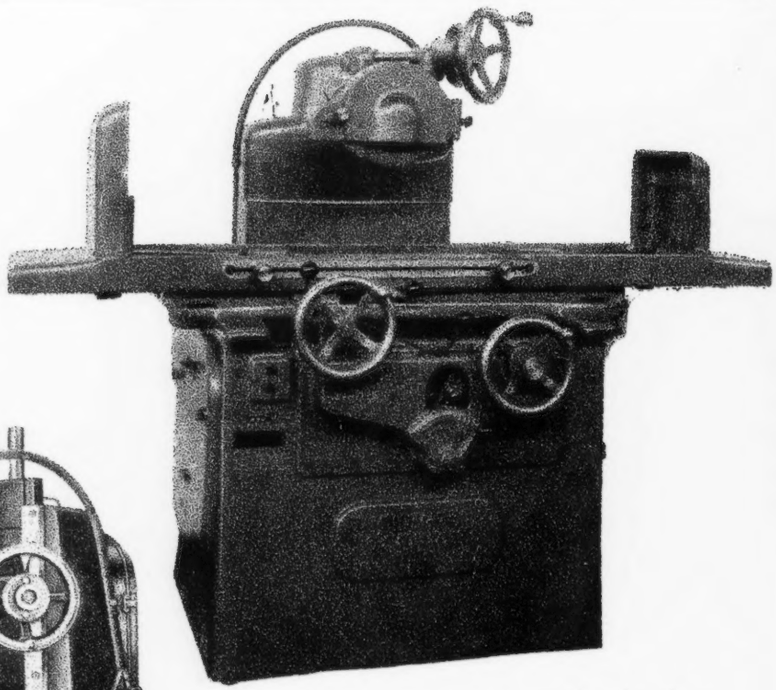


ABOVE

EX-CELL-O Modernized Carbide Tool Grinder is designed to increase the tool life of carbide tipped tools and to provide a smooth and keen cutting edge. A reduction of 90 per cent of usual sharpening time is claimed as well as the elimination of heat checks. (Ex-Cell-O Aircraft & Tool Corpn.)

AT RIGHT

DIAMOND Type G-4 Surface Grinding Machine is a new member of the company's Type G series and incorporates increased flexibility in operation. Location of hand wheels has been made more convenient. (Diamond Machine Co.)



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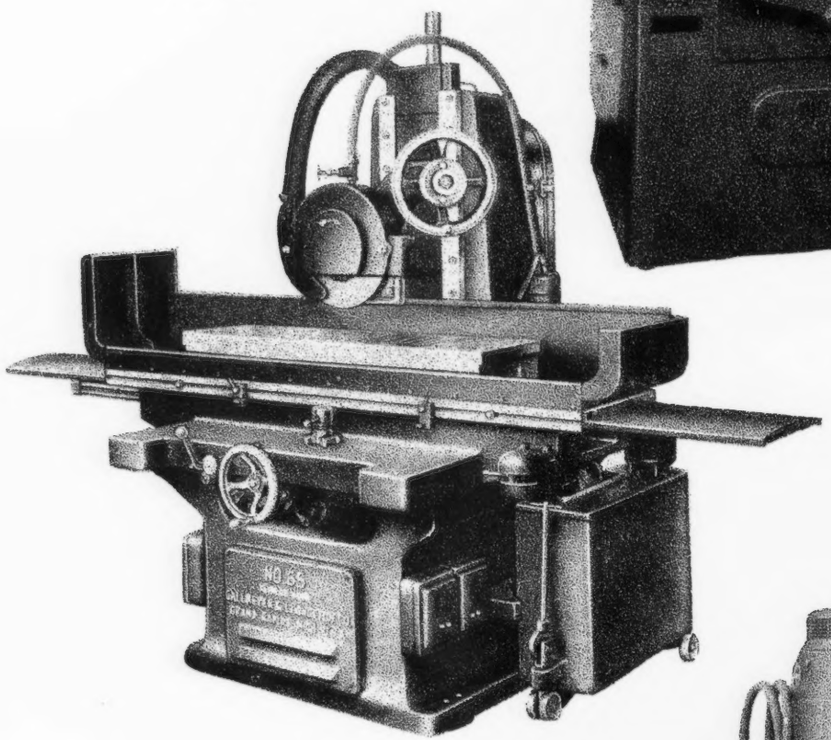

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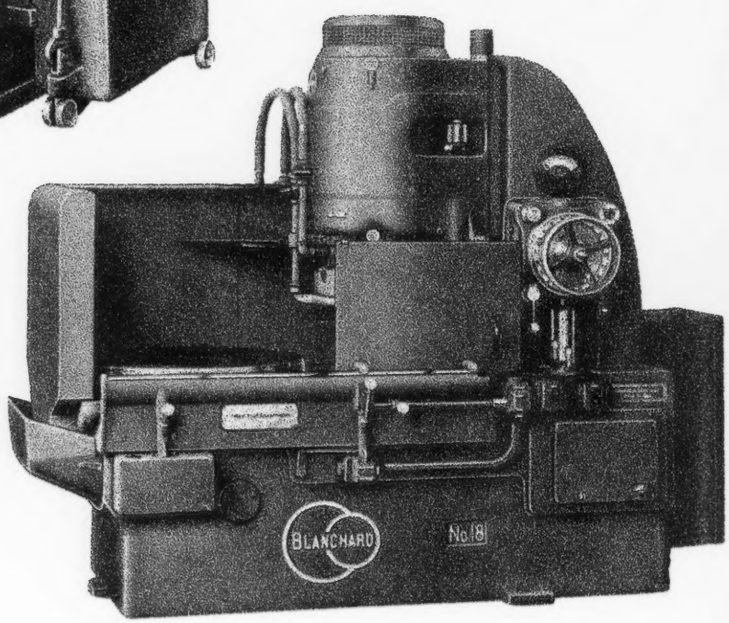
BELOW

BLANCHARD No. 18 Surface Grinder is similar in size to the company's No. 16, but has improvements in design that make it faster, more accurate and easier to operate. Power traverse for chuck is provided, chuck face is lower for easier handling and individual motors control various movements. There is a quick stop for the spindle. (Blanchard Machine Co.)



ABOVE

GALLMEYER & LIVINGSTON No. 65 Hydraulic Feed Surface Grinder is latest and largest addition to company's line. Variable hydraulic table feed and automatic cross feed. Wheel head vertical movement controlled to 0.00025 in. One shot lubrication system. (Gallmeyer & Livingston Co.)

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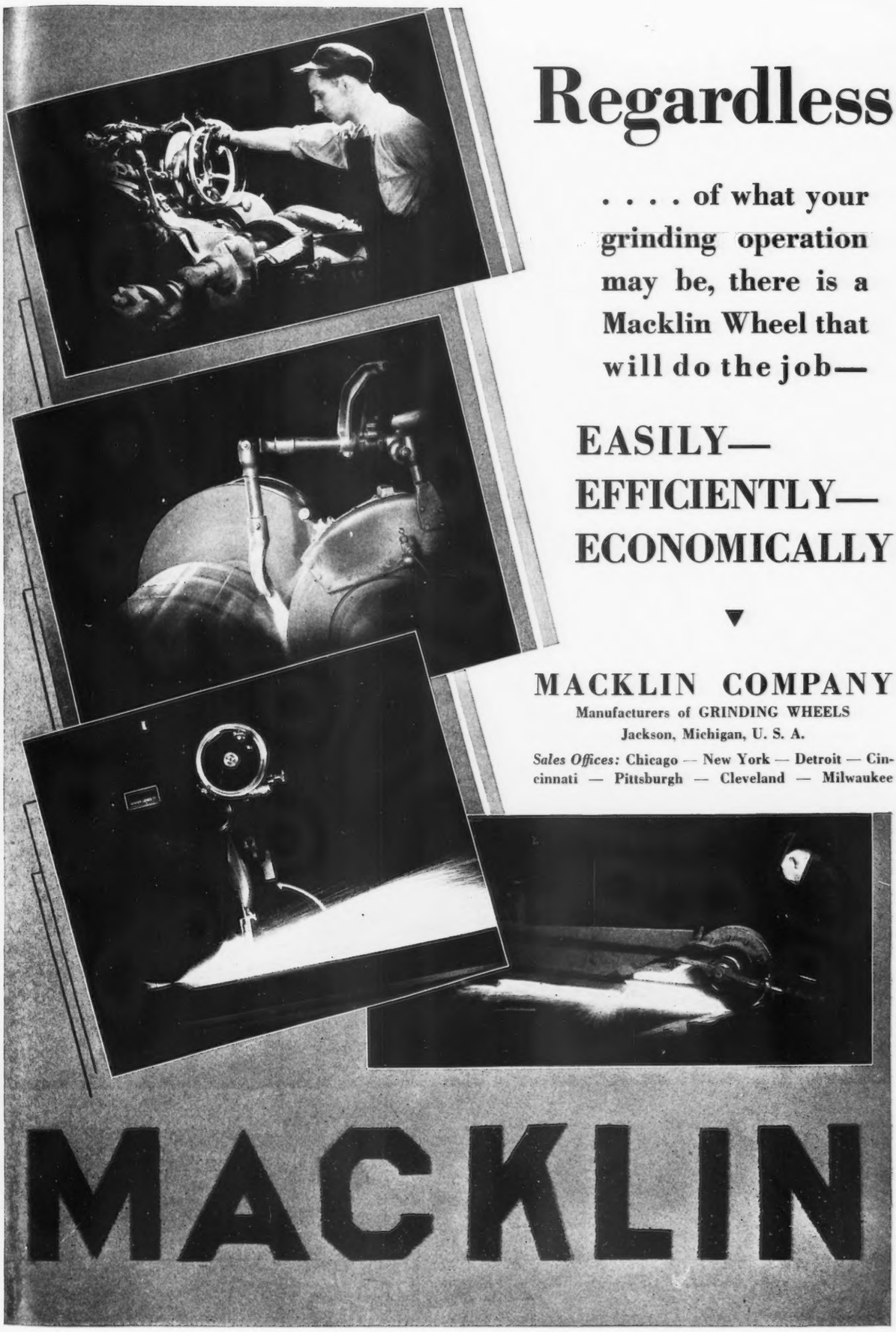


Regardless

. . . . of what your grinding operation may be, there is a Macklin Wheel that will do the job—

EASILY—
EFFICIENTLY—
ECONOMICALLY

▼

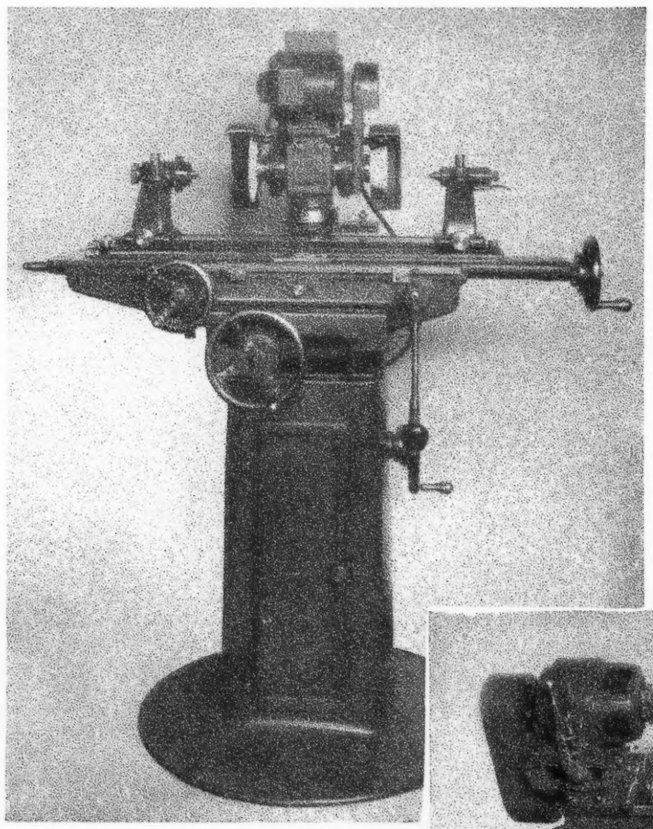
MACKLIN COMPANY

Manufacturers of GRINDING WHEELS

Jackson, Michigan, U. S. A.

Sales Offices: Chicago — New York — Detroit — Cincinnati — Pittsburgh — Cleveland — Milwaukee

MACKLIN



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AT LEFT

NORTON No. 1 Universal Tool and Cutter Grinder is a new design having a spindle of the cartridge type. A gib at one side with readily accessible adjusting screws is provided. Machine can be operated from either front or rear. (Norton Co.)

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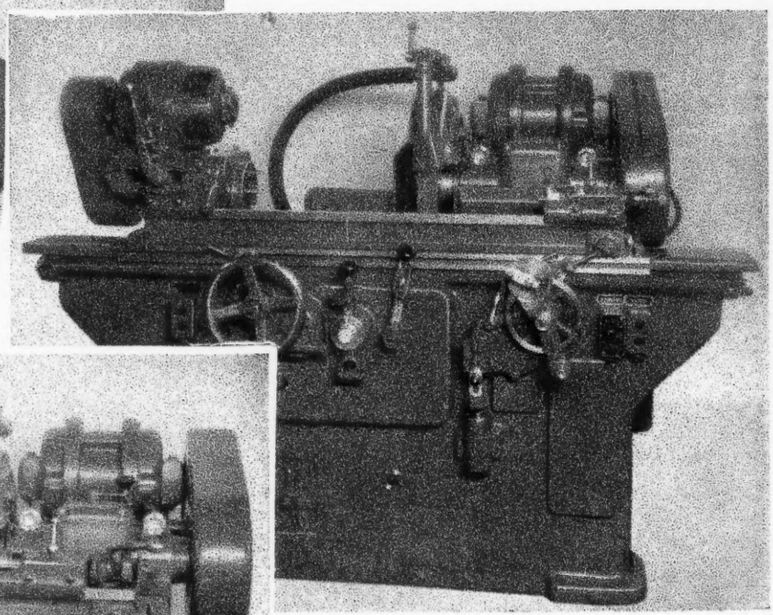

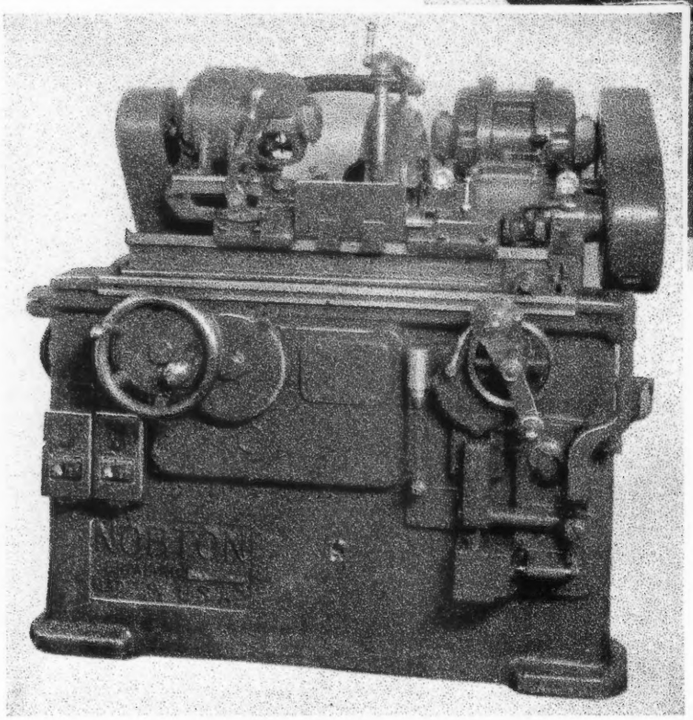

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ABOVE AND AT LEFT

NORTON Type C Semi-Automatic Grinders are now presented in 6-in. diameter capacity and 18 and 30-in. lengths. They are hydraulically operated plunge cut machines built either as semi-automatic or traverse machines or in combination. (Norton Co.)

o o o

SEE THE
LANDIS
EXHIBIT

BOOTHS
J & K
IN THE
ARCADE

LANDIS

WILL EXHIBIT 10 MACHINES IN ACTION • • • • • •

Yes, sir! When you attend the Machine Tool Show you will see ten cost reducing, product improving grinders in action at the Landis booths. All of them are recent developments. Several have not been shown or even announced before.

The following machines will be included in the exhibit:

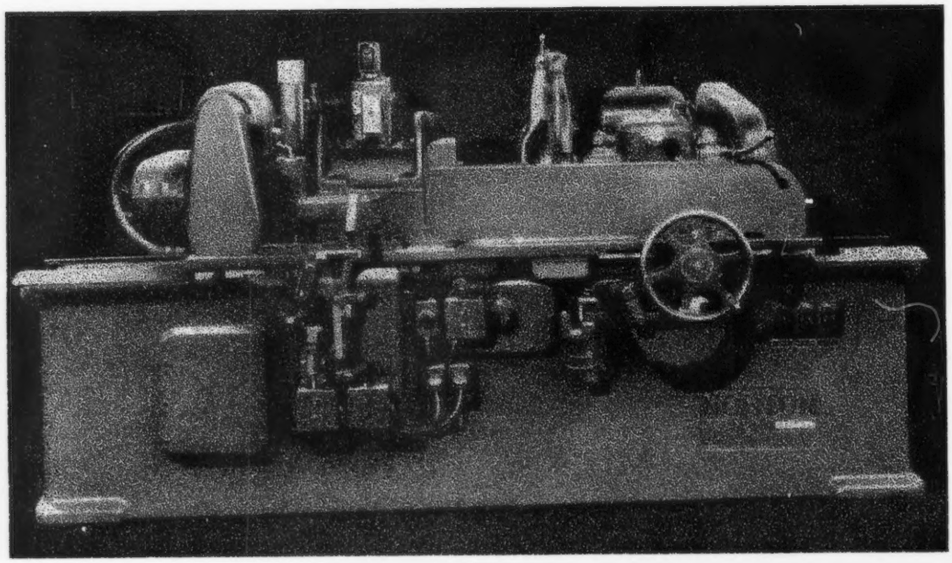
5″x40″ Hydraulic Cam Grinder
10″x36″ Type C Semi-Automatic Hydraulic Grinder
16″x42″ Type D Hydraulic Crank Pin Grinder
3½″ Hydraulic Internal Race Grinder
5″ Hydraulic External Race Grinder
6″x18″ Type C Plain Hydraulic Grinder
14″x48″ Type D Plain Hydraulic Grinder
15″x8″ Type C Hydraulic Internal Grinder
14″x36″ Type C Hydraulic Universal Grinder
12″x32″ Tool and Cutter Grinder

After you have seen this array of Landis grinders you will be convinced that there is ample opportunity for the reduction of costs and improving of quality in *your* grinding department. By all means attend the Show and, while there, don't miss the Landis exhibit.

202

LANDIS TOOL CO.

WAYNESBORO, PENNA.

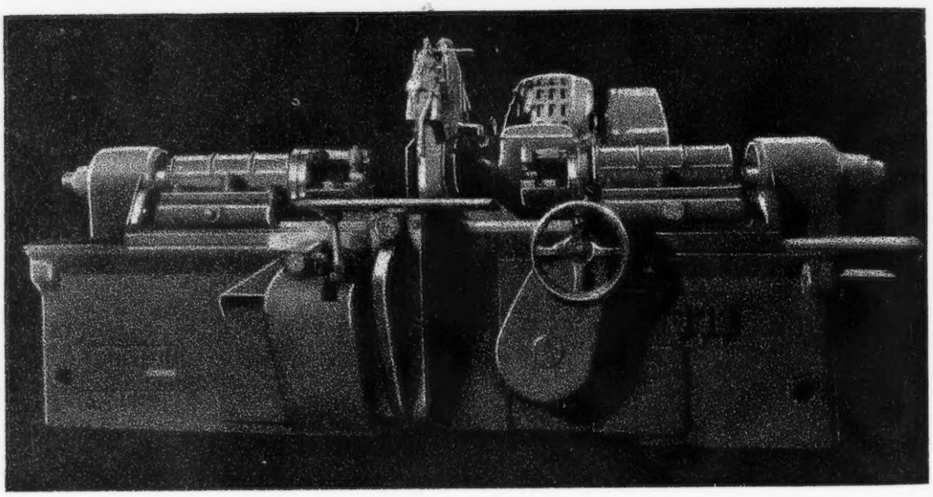


AT LEFT

NORTON Cam-O-Matic automatically and successively grinds each cam on a camshaft, trues the wheel and stops to be reloaded. Machine is electrically controlled and hydraulically operated. Wheel reciprocates during grinding but reciprocation automatically stops while wheel is being trued. (Norton Co.)

AT RIGHT

NORTON D-86 Crankpin Grinder is an entirely new machine for grinding automotive crankpins. But two levers and one hand wheel are required to operate. A hydraulically operated steadyrest is provided with automatic operation. Controls are interlocked. (Norton Co.)



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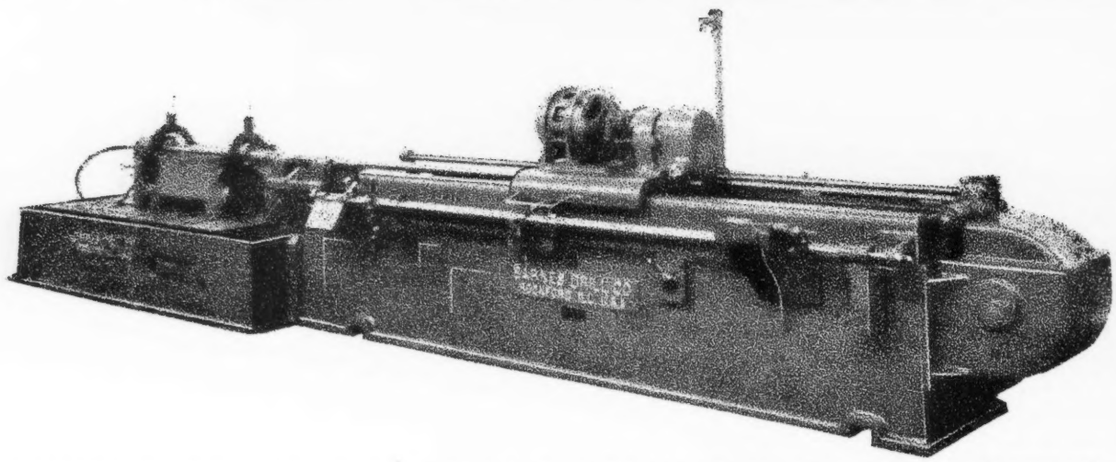
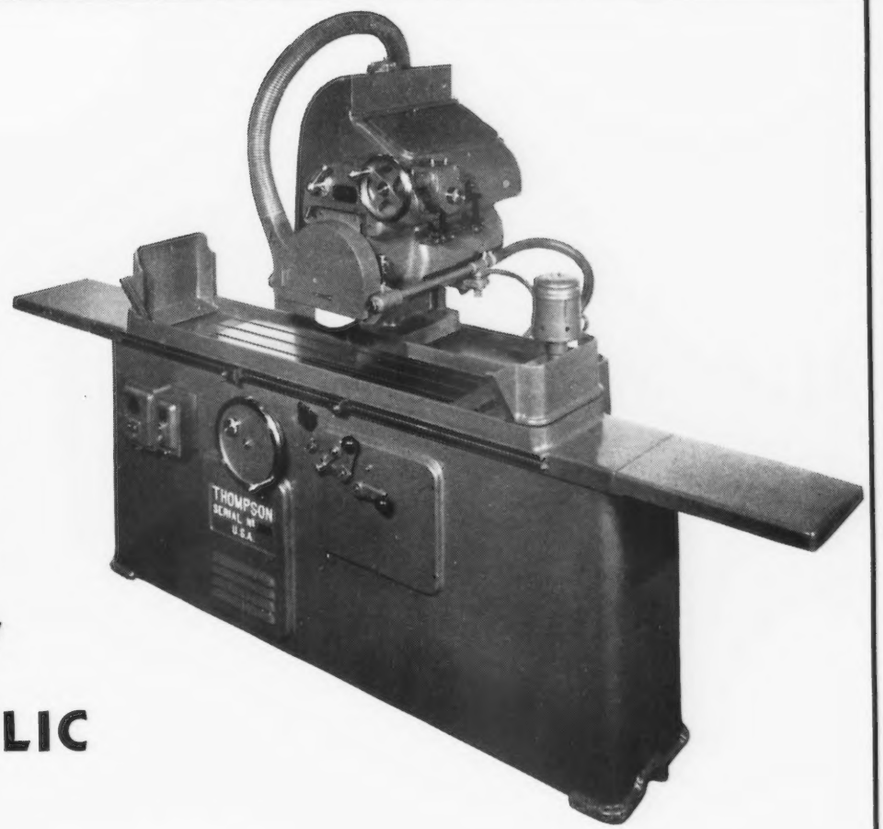


BARNES DRILL CO. Horizontal Honing Machine has hydraulic, single-lever spindle control and is self-oiling. Equipped with patent-pending device for straight line lapping to remove cross hatches. Built for any length of cylinder or tube required. (Barnes Drill Co.)

AT THE SHOW DOOR ASK FOR 24

And See

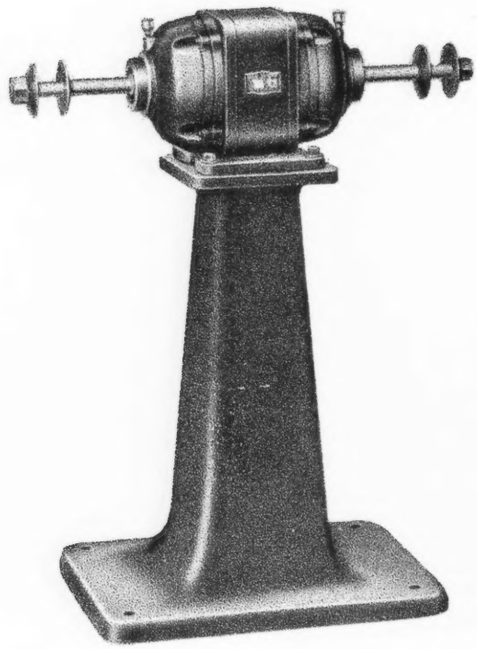
THE NEW 9 x 40 FULLY HYDRAULIC



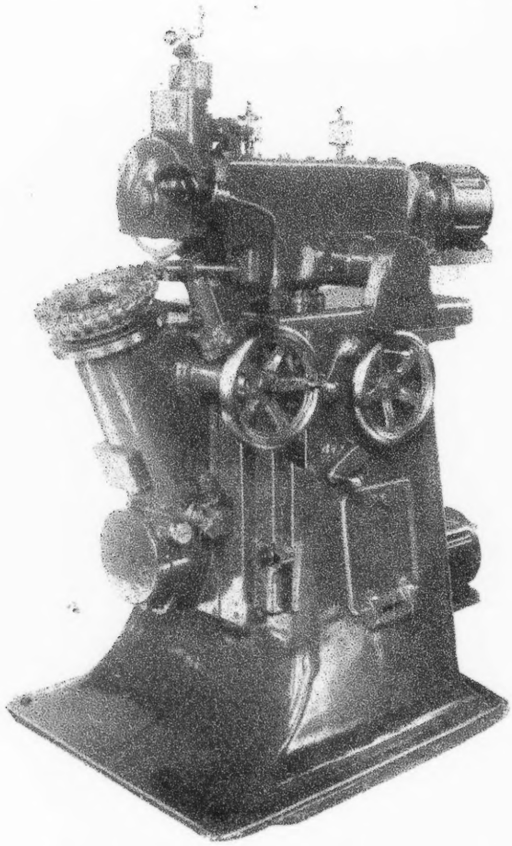
- HYDRAULIC WHEEL HEAD FEED
- HYDRAULIC WHEEL TRUING
- HYDRAULIC WHEEL HEAD RAPID TRAVERSE
- PRECISION MOTORIZED SPINDLE
- HYDRAULIC TABLE 10-90 F. P. M.
- HYDRAULIC COUNTER-BALANCE
- AUTOMATIC WHEEL TRUING
- PRESSURE FEED OILING (FILTERED)

THOMPSON

THE THOMPSON GRINDER COMPANY, Springfield, Ohio, U.S.A.



BALDOR Pedestal Type 32 M Buffer is designed with sealed ball bearings and tapered end plates for bulky product buffing. It is powered with a 2-hp. built-in motor running at 1725 r.p.m. (Baldor Electric Co., Apparatus Division.)



OLIVER Full Automatic Face Mill Grinder has a mechanically indexed work spindle and uses no index plates. A ram locates each tooth in proper position. Wheel is diamond dressed at each reciprocation and hence cannot load. (Oliver Instrument Co.)

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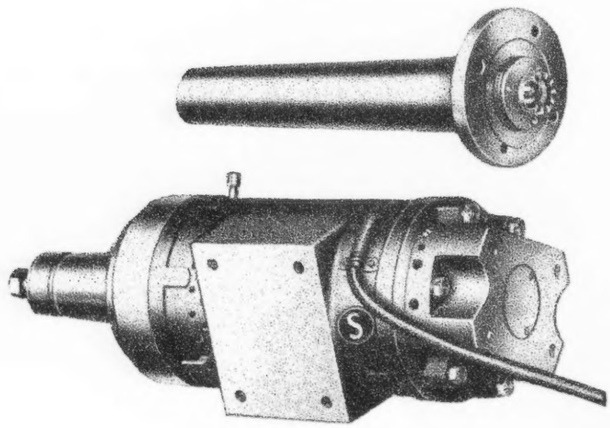

ABOVE

STANDARD Electrical Combination Angle Plate Grinder is made in three sizes and may be mounted on boring mill, planer or lathe. For external and internal grinding with straight side or cup wheels. (Standard Electrical Tool Co.)

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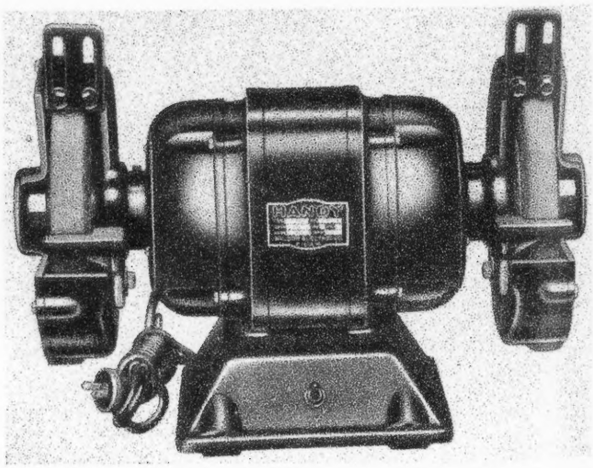


AT RIGHT

BALDOR Bench Grinder, Type X2C, is powered with a capacitator-type motor in which the only moving part is the rotor. It is powered with 1/2 hp. and takes 6 by 5/8-in. wheels. (Baldor Electric Co., Apparatus Division.)

1935 MACHINE TOOL SHOW
CLEVELAND SEPT. 11-21

NEW

No. 3B

ABRASIVE SURFACE GRINDER

24″ x 8″ x 12″

Other good INVESTMENTS to be seen in our —Booth No. 405—

include:—

No. 1½ Hand Feed Surface Grinder

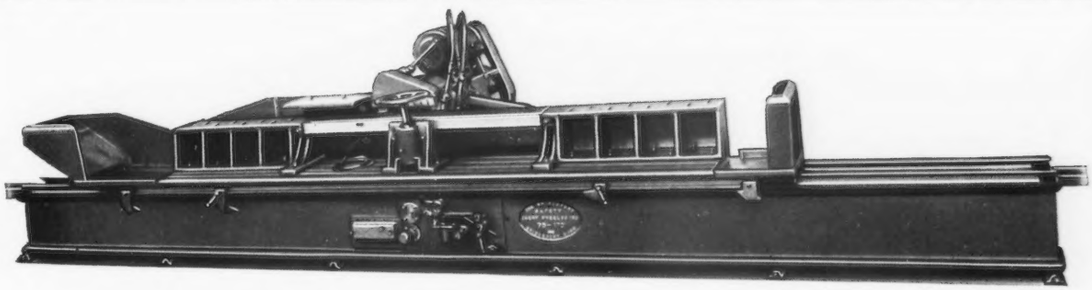
No. 33 Vertical Spindle Surface Grinder

12″ Face Grinder

Motorized Dust Exhaust Attachments and many other Surface Grinder Accessories.

ABRASIVE MACHINE TOOL CO.

EAST PROVIDENCE, R. I.



Modern Bridgeport Hydraulic Face Grinder, arranged for grinding Shear Blades

GRINDING PROGRESS reaches its culmination in the new Bridgeport Hydraulic Face Grinders. These machines are incomparably fast, powerful and accurate. The "Oilgear" table travels at any travel up to 90 feet per minute, assuring the proper speed for every particular job. Vee and flat ways on the bed are force feed lubricated. Timken equipped spindle. Bridgeport Sectional Grinding Wheels, 26″, 32″ or 42″—are standard equipment, of course.

No user of face grinders should be without the details of these modern machines. May we send you details regarding these machines and other Bridgeport Products?

See our exhibit booth 25 Machine Tool Exposition

BRIDGEPORT SAFETY EMERY WHEEL CO., Inc.

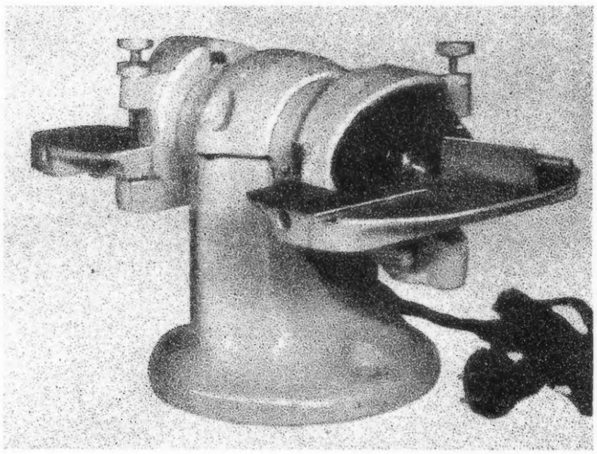
1284 W. Broad St., Bridgeport, Conn.

Bridgeport Products:

GRINDING WHEELS
(Vitrified, Silicate or Bakelite)

MACHINES

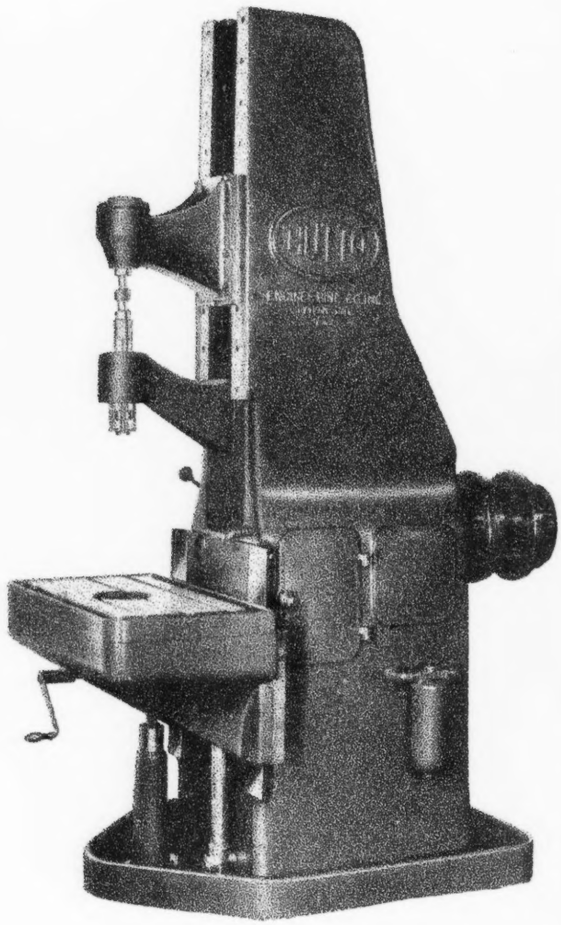
Floor Grinders, Tool Grinders, Shear Blade Grinder, Abrasaw Cut-Off Machine, Face Grinders, Knife Grinders, Swing Frame Grinders, Buffing and Polishing Machines, Sectional Grinding Wheels.



ABOVE

DOUBLE End Electric Tool Grinder, of bench type, is particularly designed for grinding carbide tools. (Thomas Prosser & Son.)

° ° °



AT RIGHT

HUTTO V Series Hydraulic Honing Machine has variable speed mechanical rotation drive and variable hydro-mechanical reciprocation drive. Variable V-belt drive, infinitely adjustable and hydraulically controlled drive clutch. (Carborundum Co., Hutto Division.)

Rebuild Prosperity with Improved Machinery

(CONTINUED FROM PAGE 100)

doxy and their resistance to drastic changes in style have had a great deal to do with the continued high cost of their clothing. At any rate there is plenty of opportunity for the application of machine technique here, and the original mind may well apply itself to its development in hitherto unrecognized ways.

From these few suggestions it is apparent that completely new industries may be created by machines as yet uninvented. Add to them others, which will arise out of the requirements of the increased leisure brought about by the machine reduction of the average number of weekly working hours. We have already had a forecast of what may be expected, in the enlarged demand for sporting goods and the tools and material of vocational training consequent upon the enforced joblessness of the depression.

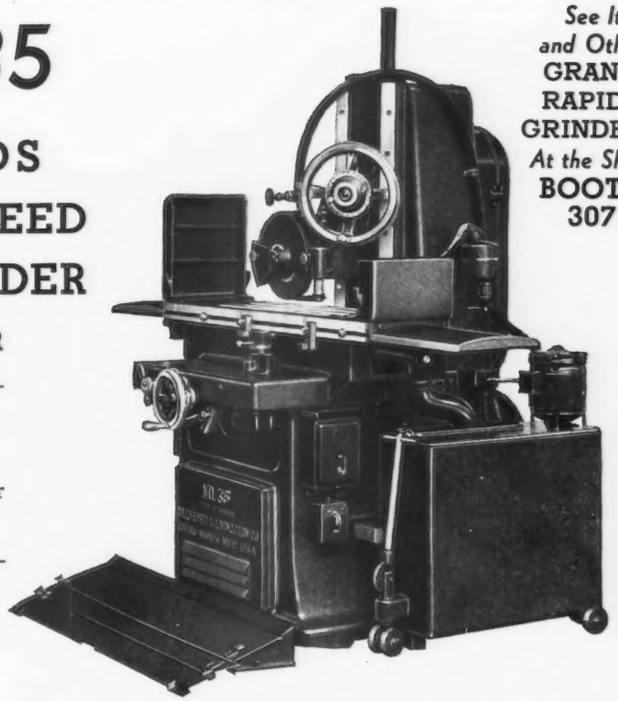
It would be idle to speculate upon the probable appearance of other mechanical and electrical contrivances in the realm of transportation, handling and distribution. Nevertheless they are sure to appear. All three activities are now woefully inefficient. The present conception of railroading is already undergoing a radical change. Marine architecture is in the throes of complete revision. And, lately, the crossing of the continent by a Diesel-motored automobile, at a fuel cost of $7.69, foreshadows a revolutionary change in car design—not to mention the whole business of oil refining.

All these developments in consumer machines and machine applications call for renewed and improved production machinery all the way back through the shops and factories to the machine tool plant and the steel mill. It requires, therefore, no stretch of the imagination to foresee the imminence of a greatly intensified Machine Age, which will sweep us on into a new era of industrial and business prosperity. The machine, indeed, is far more likely to be the cure than the cause of the ills of the world.

Latest No. 35

GRAND RAPIDS HYDRAULIC FEED SURFACE GRINDER

See It and Other **GRAND RAPIDS GRINDERS** *At the Show* **BOOTH 307**



FINER – FASTER – SMOOTHER

Built Around Properly Designed One-Piece Column and Base Casting

One Shot Lubricating

V Belt Drive to Spindle Providing for 2 Spindle Speeds

Don't Miss the Chance to See These Machines in Operation

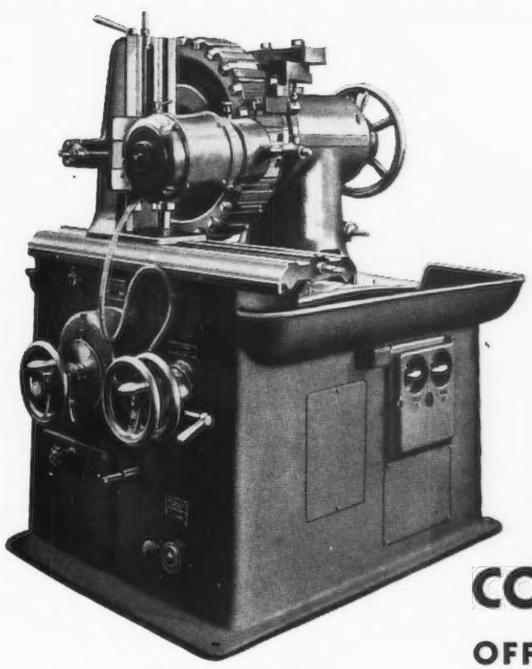
THEY HELP PAY DIVIDENDS

Bulletins On Request

GALLMEYER & LIVINGSTON CO.

315 STRAIGHT AVE. S.W. GRAND RAPIDS, MICHIGAN, U.S.A.

AUTOMATIC MILLING CUTTER GRINDER



This machine grinds automatically the face, side and chamfered edge of plain and inserted tooth milling cutters, especially tungsten carbide tipped tools.

An unskilled operator can readily take care of several machines.

Due to the unique indexing method, it finishes tools with perfect accuracy and perfect concentricity, even with cutters with inaccuracy in the blade spacing. Made in two sizes for cutters from 4 to 28 inches in diameter.

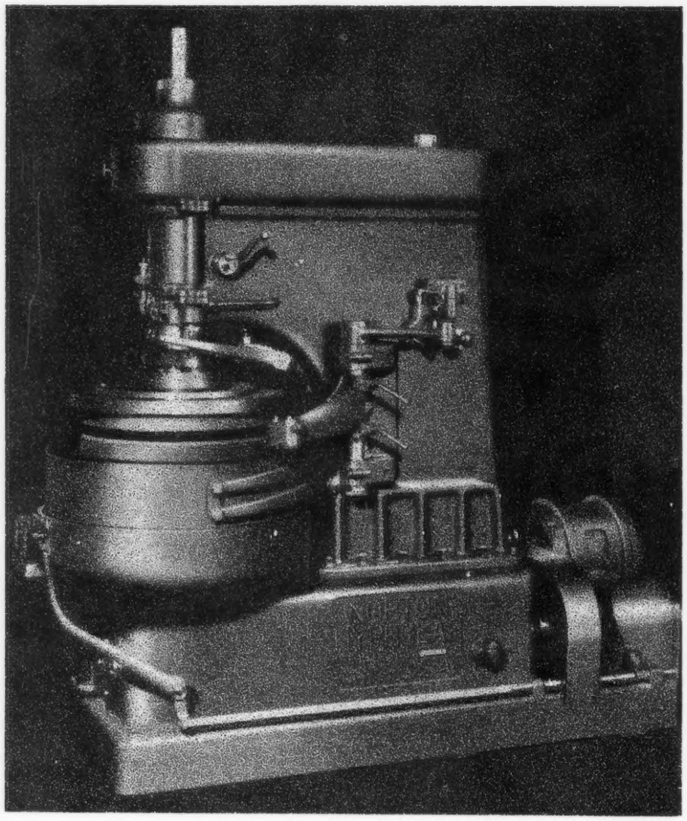
Write for Details

COLLET & ENGELHARD

Machine Tool Builders Since 1862

OFFENBACH-MAIN GERMANY

U. S. and Canadian Representatives: W. A. SCHUYLER, Fisk Bldg., New York, N. Y.



NORTON Hyprolap is a new hydraulically operated machine for high-production lapping of pieces to 6 in. diameter. Will take cylindrical work to 6 in. long. (Norton Co.)

NORTON 10-U Universal lapping machine is designed for lapping small parts such as piston rings, thrust washers, small pump gears, etc. (Norton Co.)

Appraising Machine Tool Replacement Possibilities

(CONTINUED FROM PAGE 31)

ter quality materials for moving parts. A lighter section steel casting may replace a much heavier cast iron section, hydraulic pumps may eliminate heavy, clumsy mechanical movements, electrical devices can help, and the use of light weight materials such as aluminum may be beneficial.

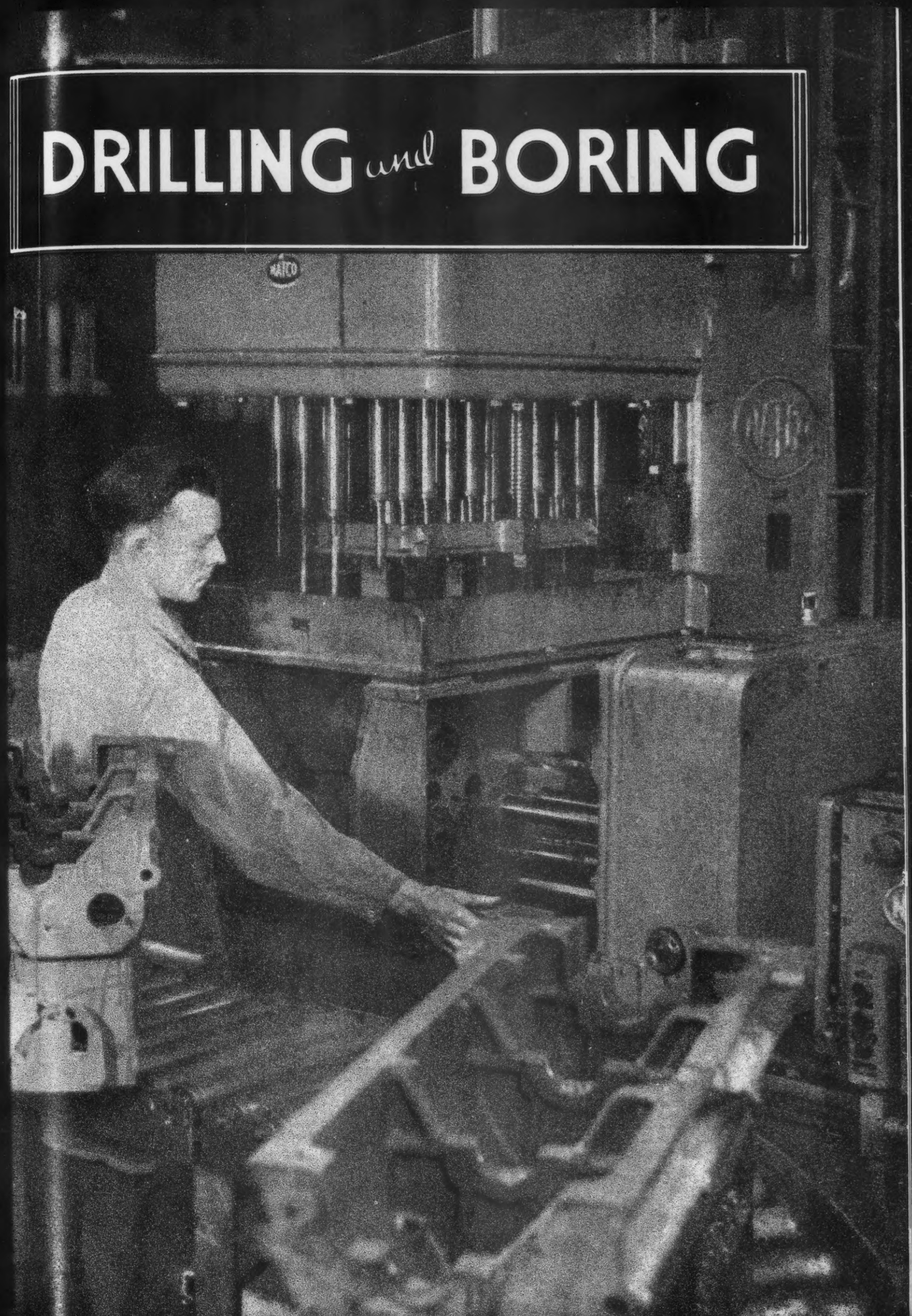
The lighter type of drill press well illustrates this point. There are on the market today a number of fine drill presses much lighter in weight than formerly. If too much weight is added to machine bases and upright columns, there is a tendency to follow along the same line in connection with gears, spindles, etc. The result then is the necessity for more power to drive the equipment, and in some cases less speed is obtained. Some commendable advances have been made in weight reduction, but much remains to be done. More and more today we find that electric welding is playing a part in cutting down weight and simplifying machine tool building.

Comparing the work of machine tool builders and designers with that of automobile builders and designers, we wish to point out that an important problem in both instances is to create something which has not only quality and efficiency, but also a good appearance. The amount of time devoted by the automobile industry to creating beauty in design of cars is an old story. The machine tool builder, in turn, has done much to improve the appearance of his product. The better equipment makers have eliminated from the design of their products unsightly brackets, motor mounts, oil tubing, square corners and rough surfaces. In many cases more pleasing appearance is achieved without any marked increase in costs. To people who love mechanics and things pertaining to the actual maintenance and operation of machinery, there is no greater pleasure than to see a machine in operation which is not only efficient, but also looks well.

Care should be exercised in the design of machine tools to provide

(CONTINUED ON PAGE 132)

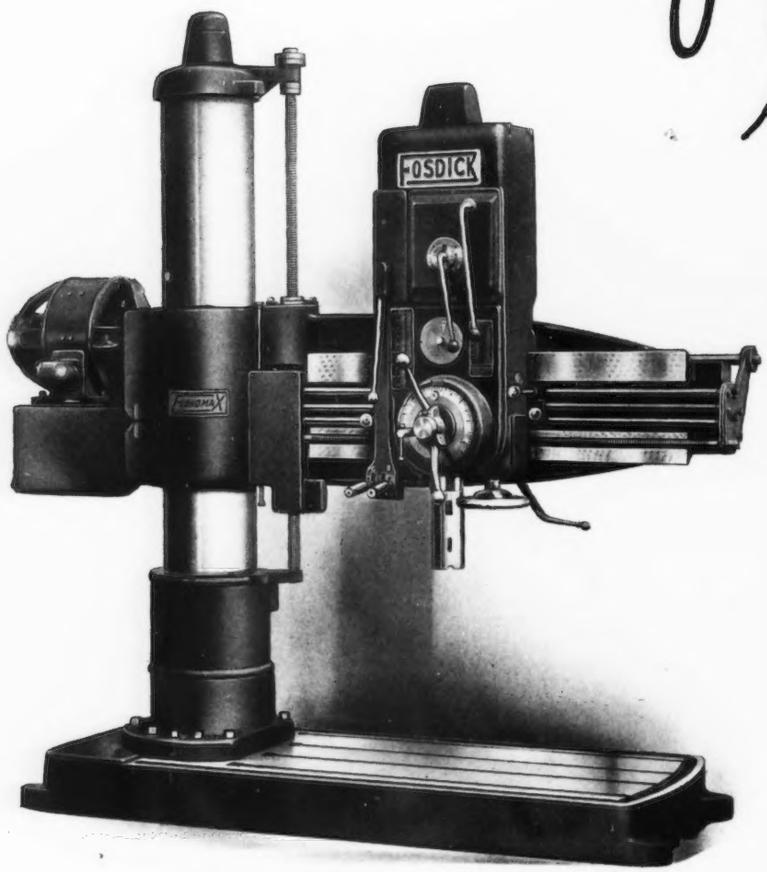
DRILLING *and* BORING



FOSDICK

..Proudly presents something radically

NEW



These Machines will be

UNVEILED

at the

CLEVELAND SHOW

•

BOOTH 1004

The

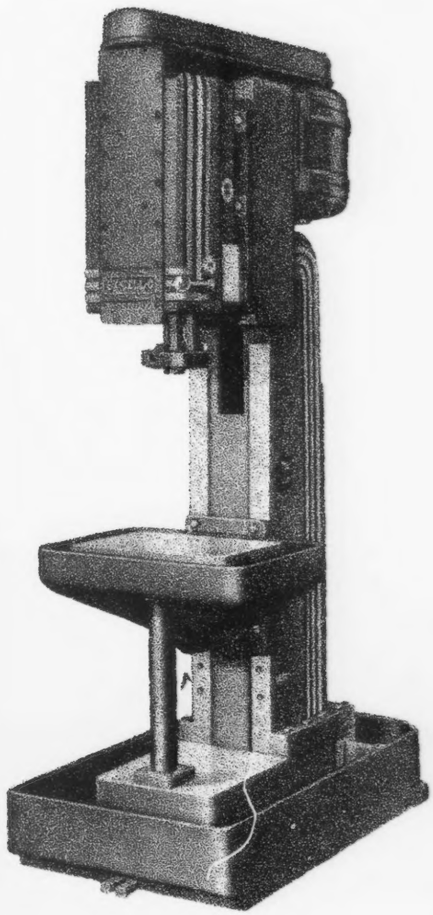
FOSDICK MACHINE TOOL CO.

CINCINNATI, OHIO

AT RIGHT

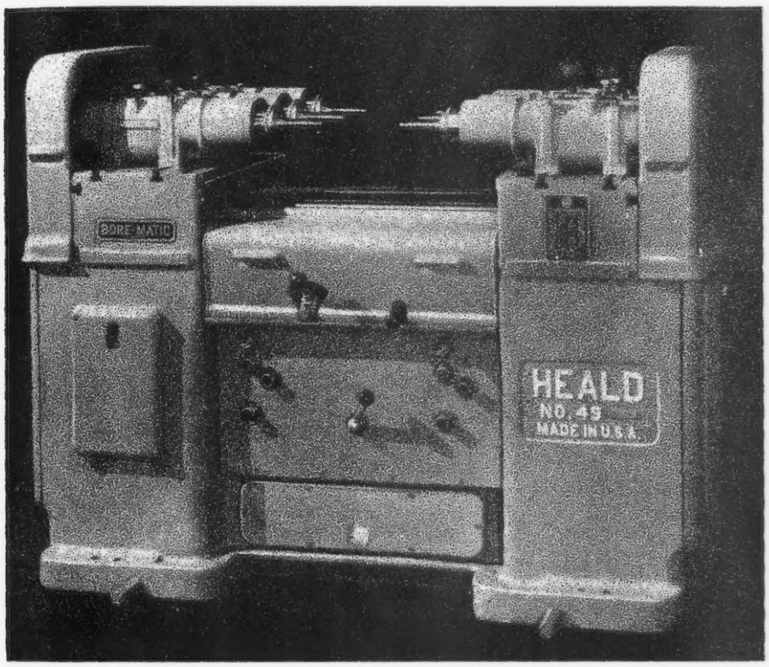
EX-CELL-O Hydraulic Drilling Machine is a new vertical, single purpose, heavy-duty manufacturing machine adapted for high-production multiple operations. Hydraulic power unit with 8 or 10-in. maximum stroke is available. Flange on quill for mounting multiple heads. (Ex-Cell-O Aircraft & Tool Corpn.)

o o o



BELOW

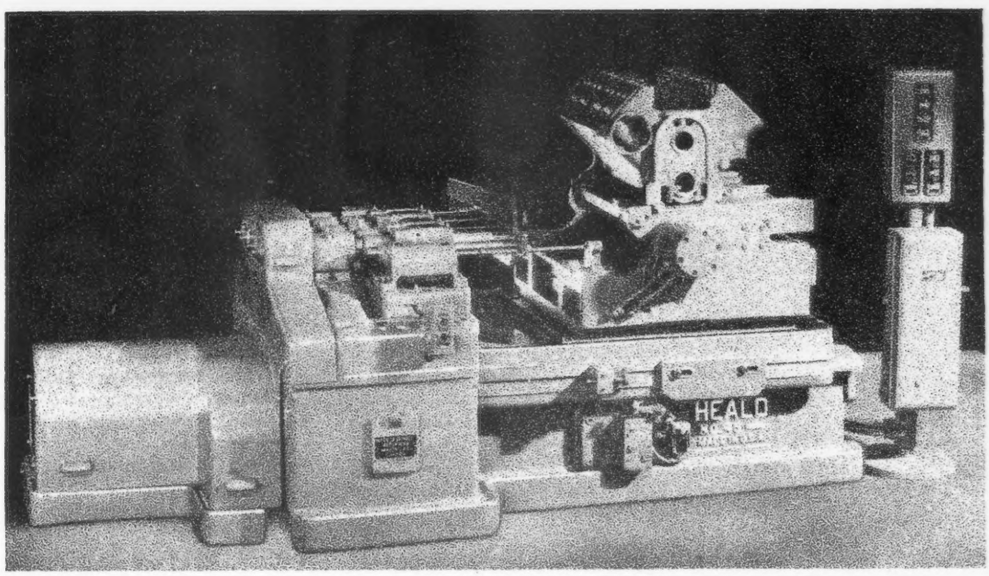
HEALD No. 49 Bore-Matic is a small, double-end machine designed for borizing several operations in individual parts or for borizing a number of different pieces handled at one setting. All electric starting and built-in hydraulic controls. (Heald Machine Co.)



o o o

AT RIGHT

HEALD No. 45 Bore-Matic is a low machine for borizing precision holes in irregular shapes. A single-end machine with reciprocating table and stationary bridge for the boring heads. (Heald Machine Co.)



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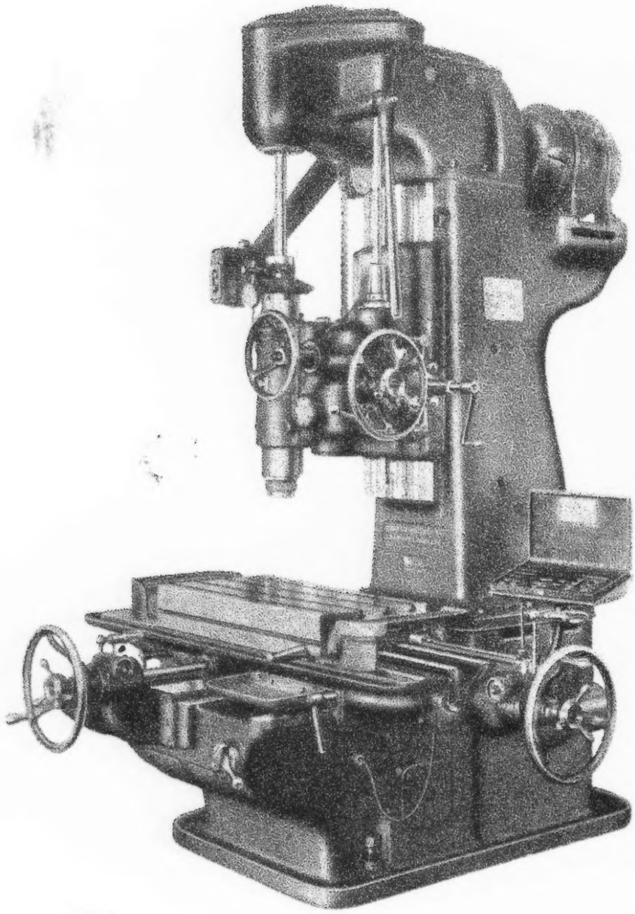
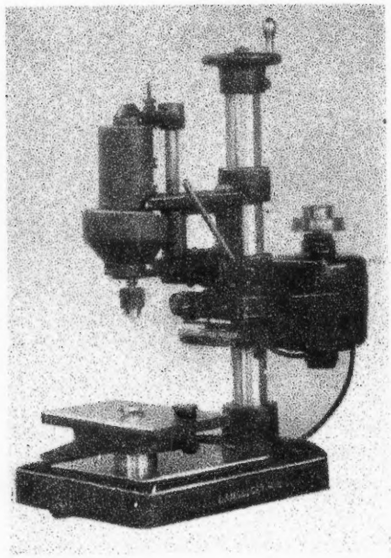


ABOVE

PRATT & WHITNEY 1935 model 2A Jig Borer follows same basic principles as before but has several "production speeding-up" features, including higher spindle speeds (37 to 1800 r.p.m.) and wider spindle feed range (0.005 to 0.0100 in.) in either direction. Dial indicator in each table slide, a dial depth indicator, and an electric light on each measuring slide and above the work facilitate operation. (Pratt & Whitney Co.)

o o o



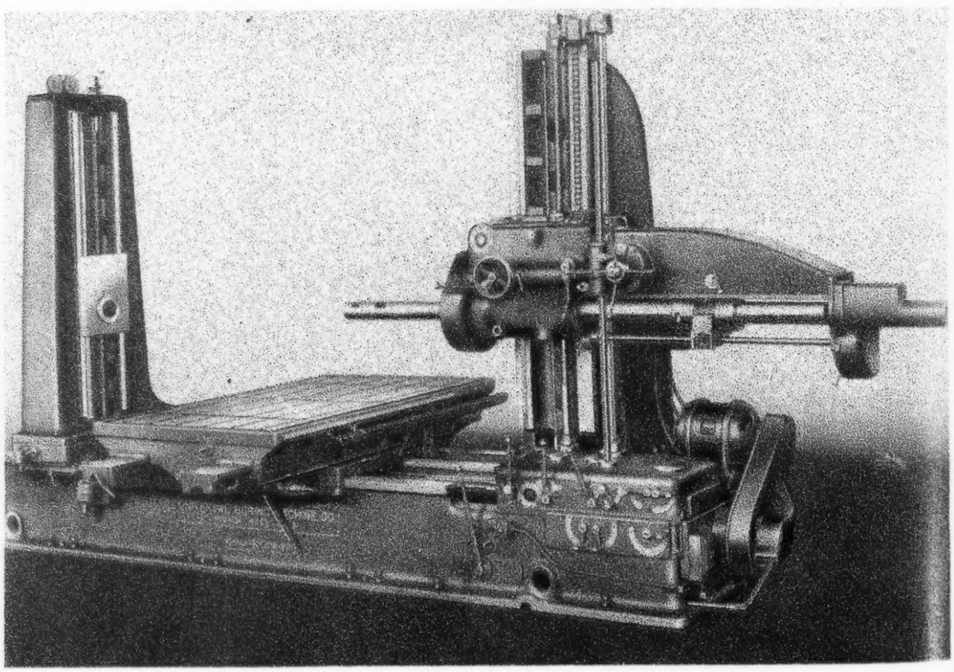
ABOVE

LANGELIER High-Speed Super Sensitive Bench Drilling Machine is designed with deeper gap from chuck to column and a new trunnion mounted sub-table. Also a new belt tensioning arrangement. Speeds from 2000 r.p.m. to 8000. Capacity, 1/4-in. drill in steel. (Langelier Mfg. Co.)

o o o

BELOW

UNIVERSAL No. 400 Series Horizontal Boring Machines comprise a No. 440 with 4-in. spindle diameter and a No. 450 with a 5-in. spindle. Designed with intent to secure a fast, powerful and accurate machine of simple construction which will have long life at minimum cost for upkeep and repairs. (Universal Boring Machine Co.)



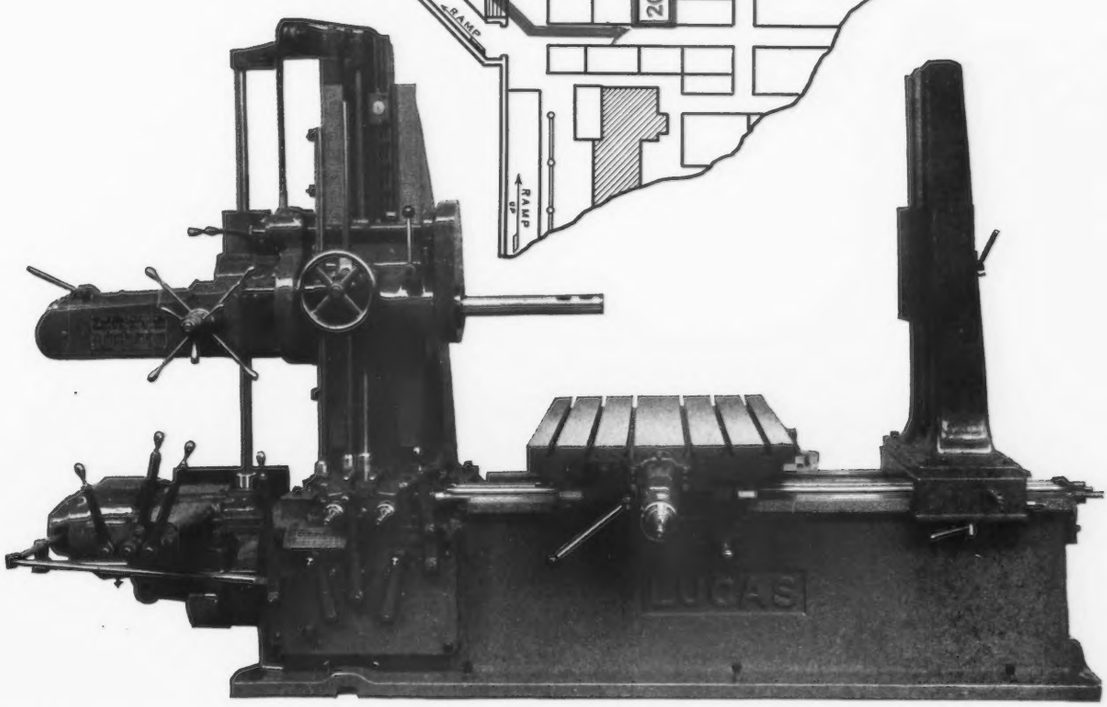
As you enter the Underground Hall of the **MACHINE TOOL SHOW** **STOP** *at the third space 202 to See the*

LUCAS "PRECISION"

Horizontal Boring, Drilling and Milling Machine

with

HI-SPEED DRIVE *to the* **MAIN SPINDLE**



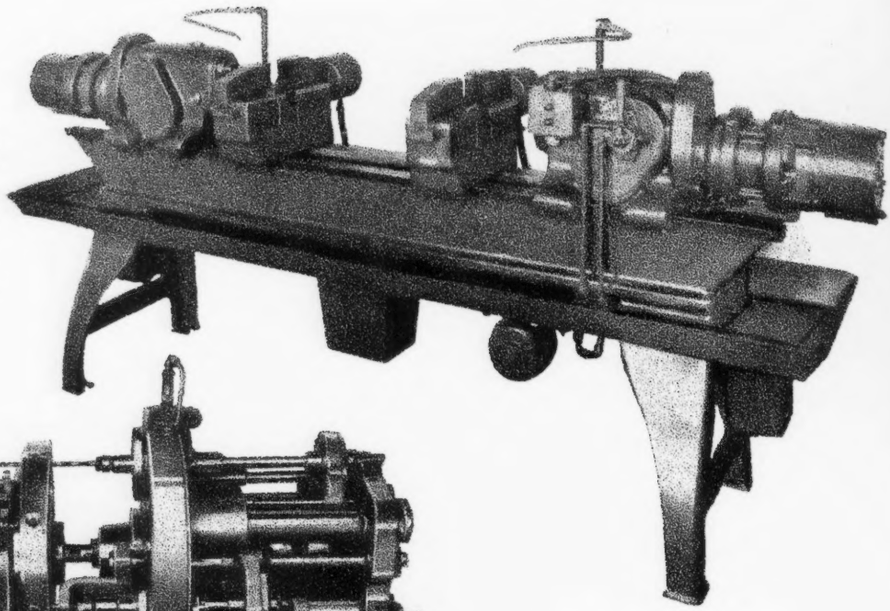
THE LUCAS MACHINE TOOL COMPANY

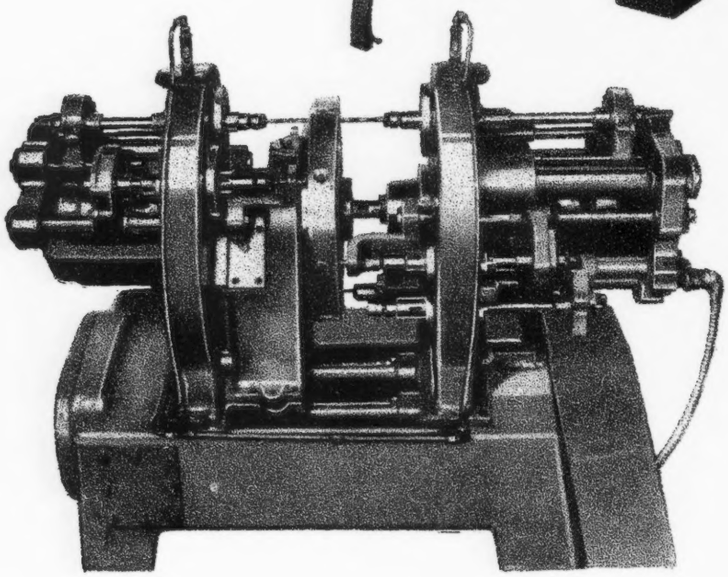
523 E. 99th St., North of St. Clair Ave.

NOW AND ALWAYS OF **CLEVELAND, OHIO**

AT RIGHT

STAR Production Drilling and Centering Machine is designed especially for centering work on a production basis. Has two independent motor driven heads each with its own cycle of speeds and feeds but arranged to operate in timed relation with each other. (Seneca Falls Machine Co.)





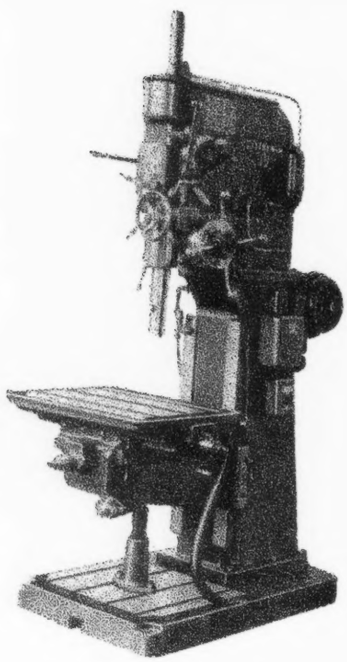
ABOVE

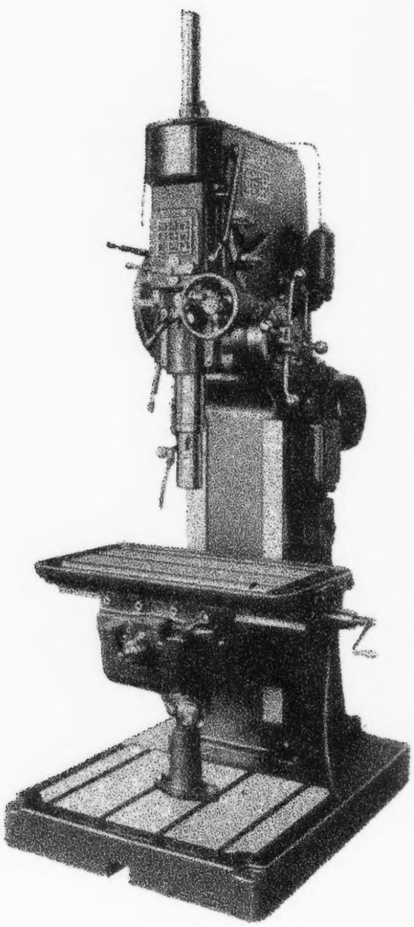
BUHR Two-Way High-Production Driller is specially designed for small parts such as carburetor and electrical parts, cotter pin holes, etc. Combined operations of countersinking and drilling two sizes are possible. Production, 3600 per hr. (Buhr Machine Tool Co.)

o o o

AT RIGHT

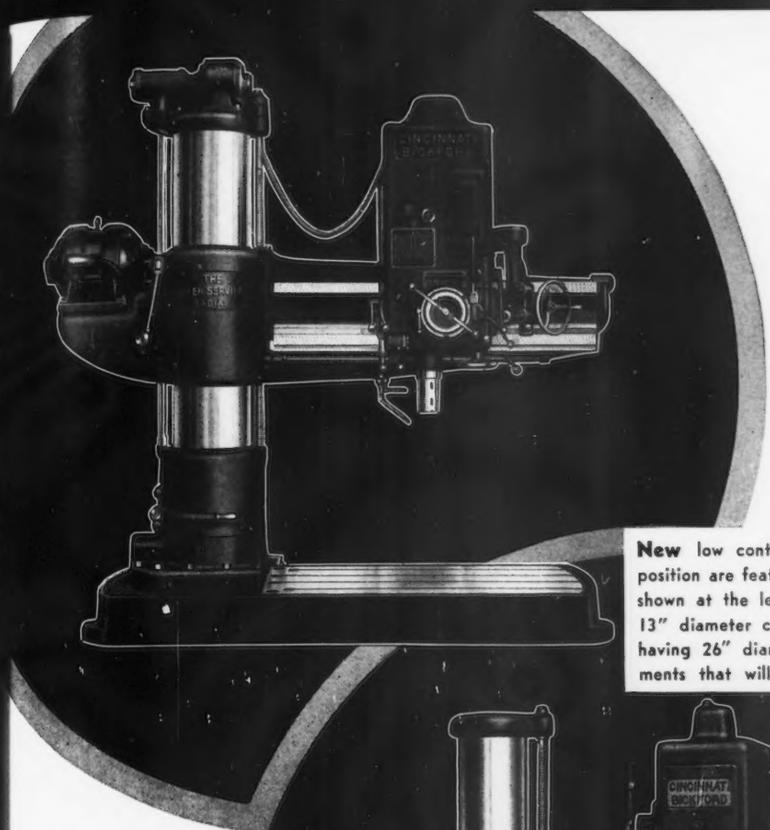
CLEEREMAN Anti-Friction High-Speed Drilling, Boring and Tapping Machine is designed to take advantage of tungsten and tantalum carbide tools. Completely geared, positive control and automatic oiling. Made in two models and six sizes with capacity up to 2 in. in mild steel. (Cleereman Machine Tool Co.)



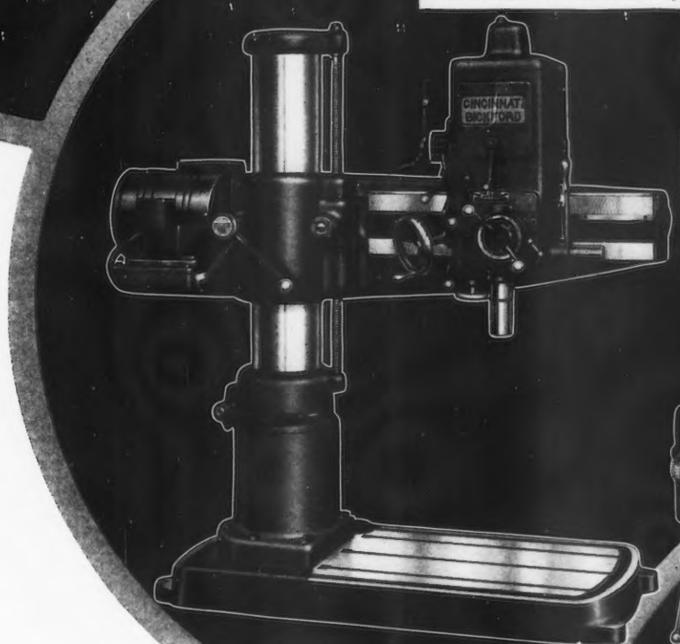


Look at All Three

EACH HAS NEW COST CUTTING FEATURES



New low controls centralized 100% at the operating position are featured on the line of Super-Service Radials shown at the left. All sizes, from the 4' machine with 13" diameter column to the powerful 12' arm machine having 26" diameter column, incorporate new improvements that will save money in your drill department.



New High Speed 3' and 4' Super-Service Radials will provide a speed range to suit your work no matter how small your drilling. All speeds and feeds changed by sliding gears with single lever control at the head. Balanced head and arm move on antifriction bearings for the ultimate in fast, easy handling.

The most important machines in your shop include your radial and upright drills. New savings are possible with the recent Cincinnati Bickford developments. Features to give you "more holes per dollar" will be shown in **Booth 406** at Cleveland. If you don't attend, keep posted by writing for our latest catalogs.

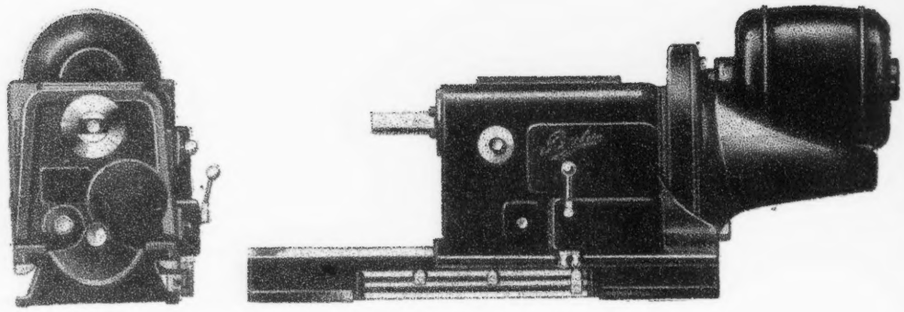
21", 24", and 28" Super-Service Uprights, round and box column types, set a new standard for convenience, stamina, accuracy and general production efficiency. One modern improvement is the elimination of all friction clutches. Be sure to get details of this new design.

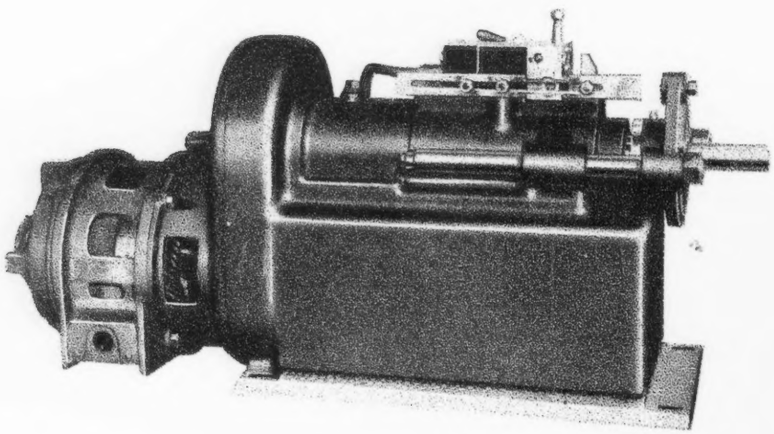
The Cincinnati Bickford Tool Company

Oakley, Cincinnati, Ohio, U. S. A.

AT RIGHT

BUHR Hydroscru Power Unit may be used as a single unit or as two to four way set-ups with multiple heads and combinations of vertical, horizontal and angular positions. Maximum stroke, 18 in. Control provided for feeds and rapid traverse in step-drilling. (Buhr Machine Tool Co.)





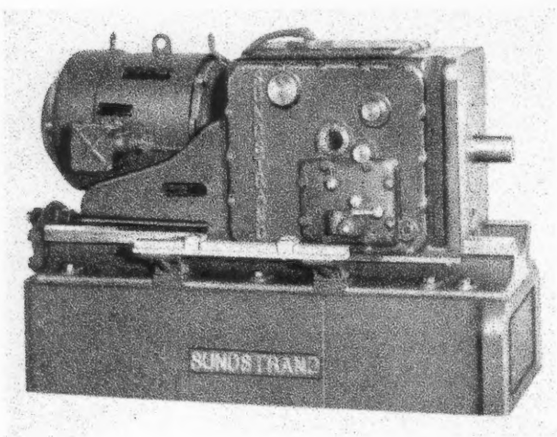
AT LEFT

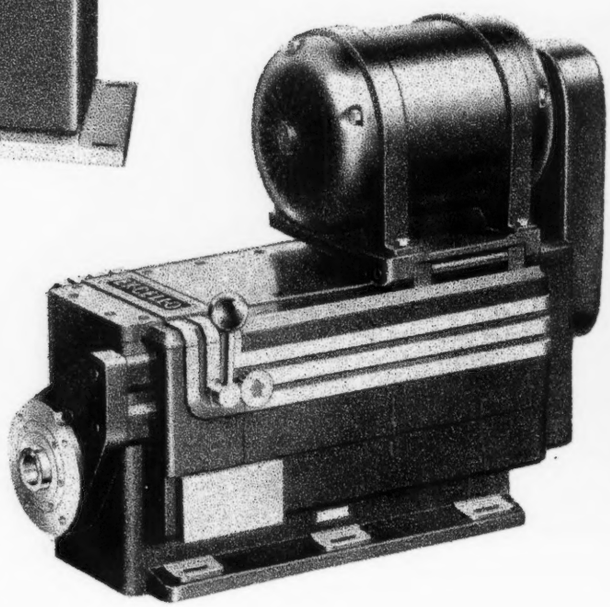
HOEFER Self-Contained Hydraulic Feed Drilling Unit is designed in a range of sizes from 1½ to 10 hp. for use in any position. Rapid approach is provided and control enables use of continuous or interrupted work cycle. (Hoefer Mfg. Co.)

o o o

BELOW

SUNDSTRAND Hydraulic Sliding Head Drill Units have been designed in 5, 7½, 10, 15 and 20-hp. standard sizes. They are suitable for boring, drilling, milling and similar spindle operations. Automatic operating cycles include approach, feed, slow feed, dwell, rapid return and stop as desired. (Sundstrand Machine Tool Co.)





ABOVE

EX-CELL-O Hydraulic Power Units are compact and self-contained and are particularly adapted for drilling, reaming, counterboring, spot facing and similar operations. Made in two sizes with 8 and 10-in. strokes. Operating as well as approach and return speeds have been increased. (Ex-Cell-O Aircraft & Tool Corpn.)

o o o

THE LATEST BAKER *Blessed Events*

YES..THERE ARE TWO

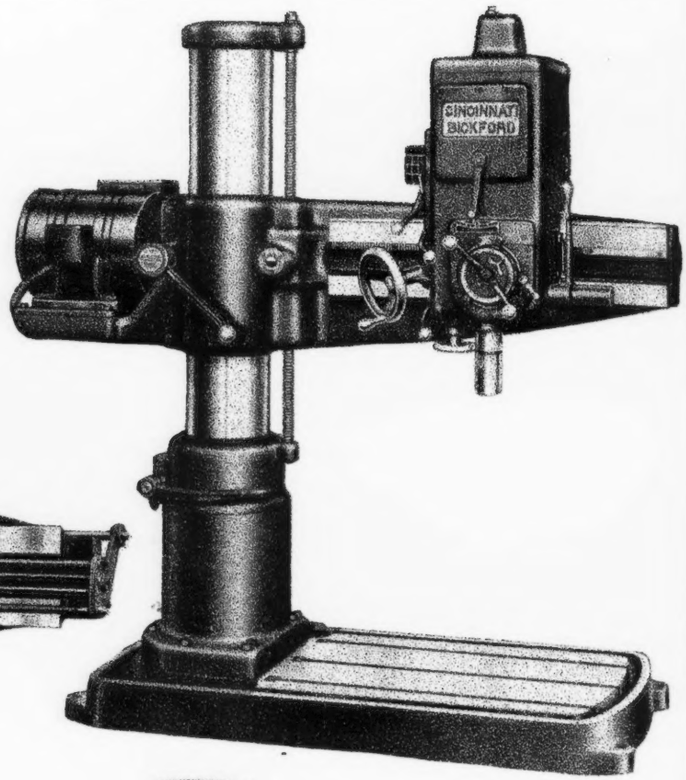
★ The newest developments of the 58 year old Baker line are displayed at the Machine Tool Show. These offspring of advanced engineering and careful manufacture are the Baker contribution to low-cost production. Look them over at Booth 307 B. They are good! . . . Production men have found it profitable to let Baker machines lower manufacturing costs. Baker Brothers, Inc. . . . Toledo, Ohio.

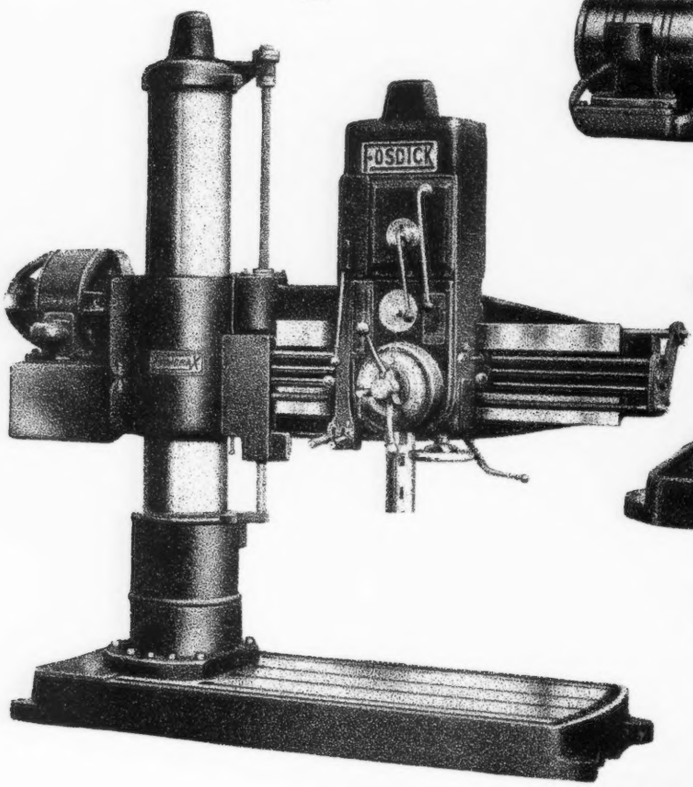
DRILLING AND BORING MACHINES . . . KEYSEATERS . . . CONTOUR GRINDERS

★ BAKER ★

AT RIGHT

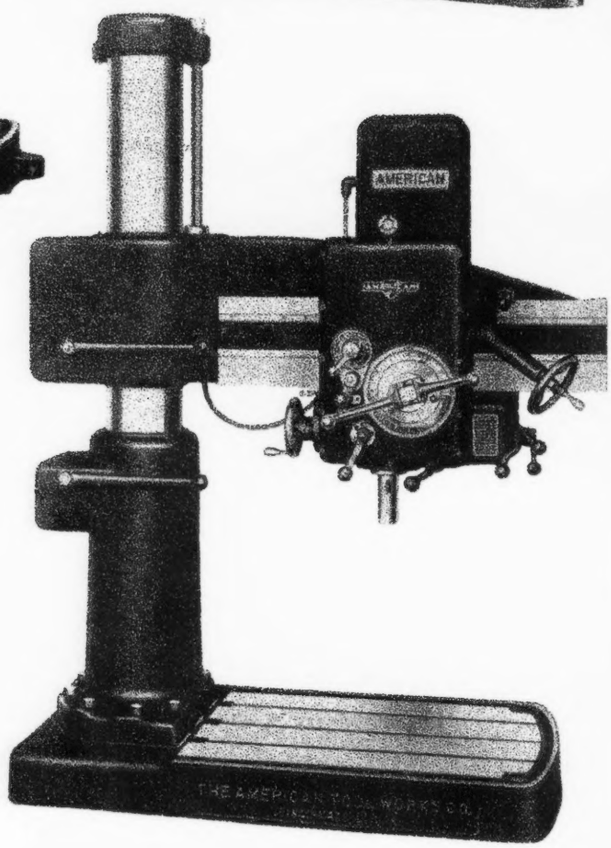
CINCINNATI-BICKFORD Super-Service Radial is a new all-geared, high-speed radial built with 3 or 4-ft. arm on a 9-in. diameter column. Nine spindle speeds are controlled by a single lever and four different feeding methods are incorporated. Unit principle of construction and automatic lubrication. (Cincinnati-Bickford Tool Co.)





ABOVE

FOSDICK Radial is now presented with a 5-ft. arm on a 17-in. diameter column. Motor is mounted on the arm, which is of rigid double-box construction. There are 36 speed changes and 18 feeds, the latter incorporating three pipe thread leads. Convenience of control is featured. (Fosdick Machine Tool Co.)



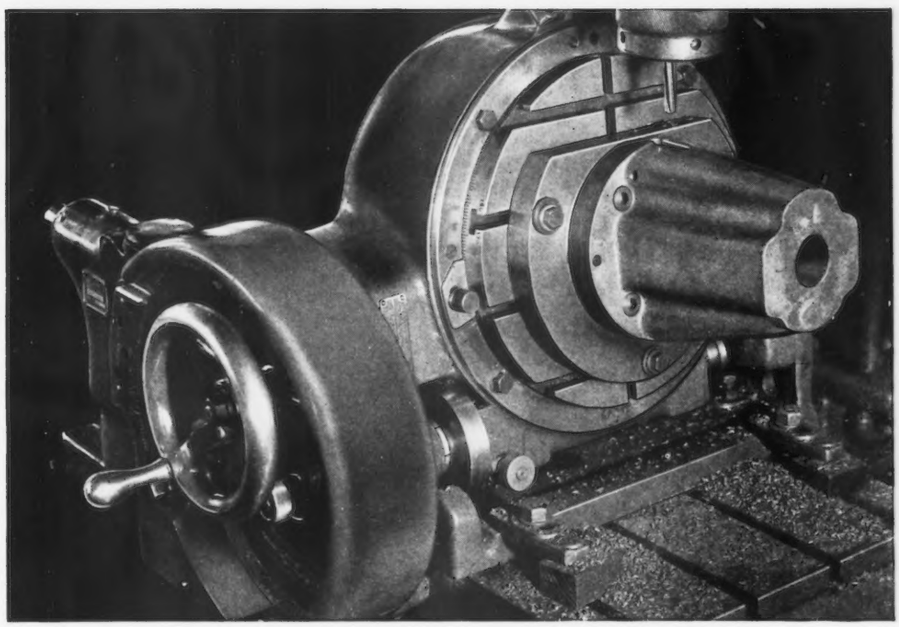
o o o

AT RIGHT

AMERICAN "Holewizard" Radial Drill is a new 18-speed machine made with 9-in. column and 3-ft. and 4-ft. arm. Head is equipped throughout with anti-friction bearings and automatically oiled. Six rates of geared power feed are provided. Speed range is from 35 to 1500 r.p.m. Capacity 1½-in. drill and tap in steel. (American Tool Works Co.)

HIGH SPEED

PRECISION BORING



AND JIG ELIMINATING

in Booth No. 906 at the Cleveland Show

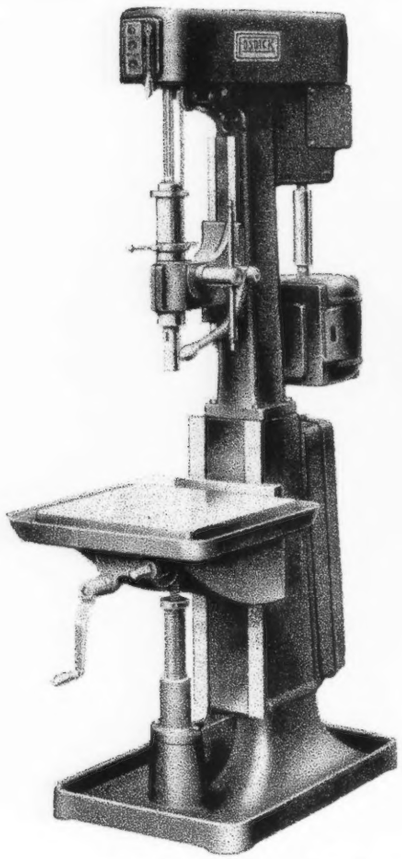
THREE Pratt & Whitney Jig Borers will be on display, the finest we have ever built. Together they cover a broad range of precision boring, from tiny jobs to big heavy pieces, and everything in between. They are modern, motor driven machines, with every convenience, fully capable of ten-thousandth accuracy. They turn out work faster than ever.

Pratt & Whitney Jig Borers are for high speed precision boring on jigs and fixtures. But modern toolrooms are using them for much more than that. Frequently, instead of building up special tooling for small lot manufacturing, the work itself can be finished entirely on these machines. It includes a wide variety of drilling, reaming, boring, facing, chamfering and light milling operations, all performed with the fine accuracy of P&W Jig Borer practice. Savings of 40% and 50% have been made on such work, and better and faster jobs obtained.

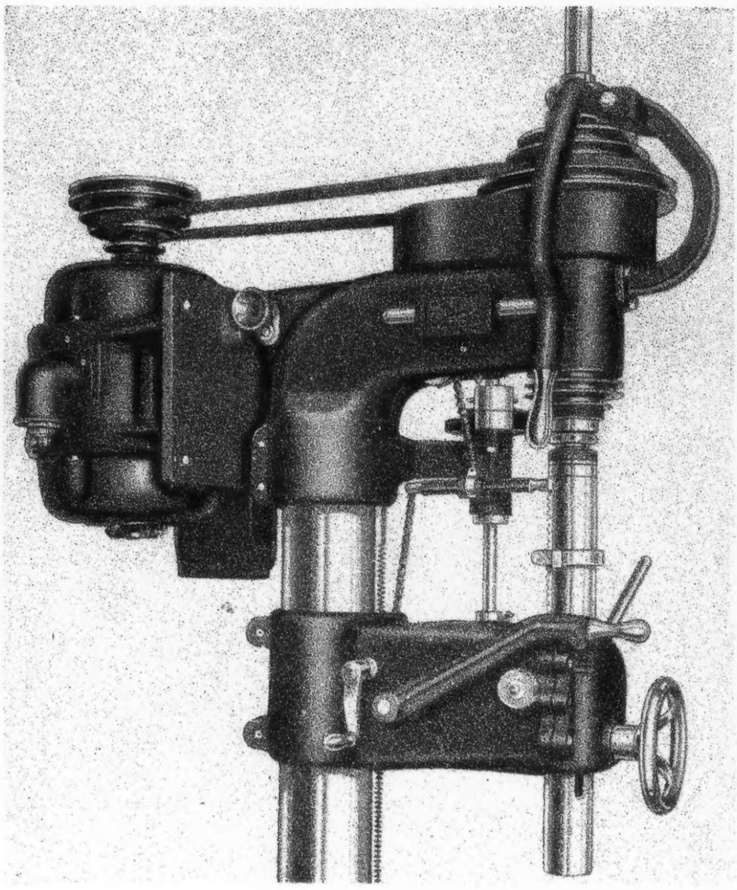
The P&W Jig Borer exhibit in Cleveland will demonstrate such work. Don't miss this unusual display of 1935 toolroom practice. There is more to be seen than just the new machines. Study the work they will be doing. It opens up new possibilities that can pay big dividends in your shop. Be sure to see the new Pratt & Whitney Jig Borers.

PRATT & WHITNEY CO.

HARTFORD, CONN.



FOSDICK No. 4 and No. 5 Sensitive Drills are new designs of which the former, with hand feed and sensitive tapping attachment, is shown. The No. 5 is of similar type, but has power feed instead of tapping attachment. Precise depth stop devices are incorporated. (Fosdick Machine Tool Co.)



BUFFALO No. 22 Drill has been redesigned for strength, rigidity and duplication of parts. Has a heavy steel column, V-belt power, ball bearings and concentrated four-point lubrication. Three hp. and eight speeds for drill range from 1/4 in. to 2 in. (Buffalo Forge Co.)

Appraising Machine Tool Replacement Possibilities

(CONTINUED FROM PAGE 120)

the best possible driving mechanism. The tendency is more and more toward motor-driven equipment.

In our own designing work and through outside machine tool builders, we have discovered that motor drives can be incorporated into the design of machine tools in such manner that the beauty of the machine itself is not marred in any way. Motor-driven equipment provides more daylight in the shop than when dark overhead belts are used, lessens noise and gives better vision. This swing-over to motor-driven tools has been accelerated, we believe, by the great improvement in electric motors in recent years.

Most Ford Tools Are Motor-Driven

We take great care to place the motors in the best location possible. Quite frequently we use the base of the machine. Electrical maintenance men object somewhat to placing motors in the bases of machines, but there is no serious reason why it should not be done in certain cases. Our endorsement of motor drives is best shown by the fact that of the 66,000 machine tools purchased for Ford plants since the company started, about 60,000 of them were originally purchased as motor-driven equipment and all of the 42,000 Ford-owned machines in use today are of this type.

We have always placed special emphasis on the safety factor in connection with our machine tool equipment, whether we built it ourselves or purchased it outside. Our machine tools must be fool-proof.

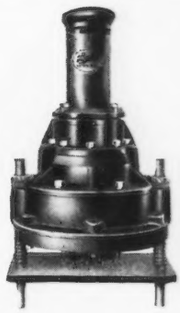
For super production

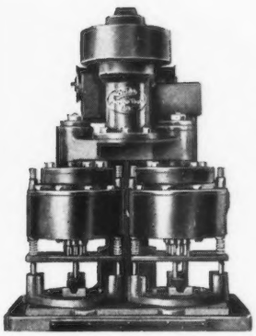
at low cost

Buhr PATENT THE PIONEER MULTIPLE

DRILLING & TAPPING HEADS

(BALL BEARING)





"Buhr" Heads were the pioneer in radial ballbearing construction of multiple heads. "Buhr" Heads are characterized by extreme accuracy—the center between spindles not only with a tolerance of between .0005" and .0010" but parallel with each other at the extreme length of a given drill. For "super" production at low cost, "Buhr" adjustable heads have a standard of efficiency in design and construction that have met the ever-increasing requirements of the automotive field. Upon request we will be pleased to send data on our complete, timely products.

BUHR MACHINE TOOL CO.

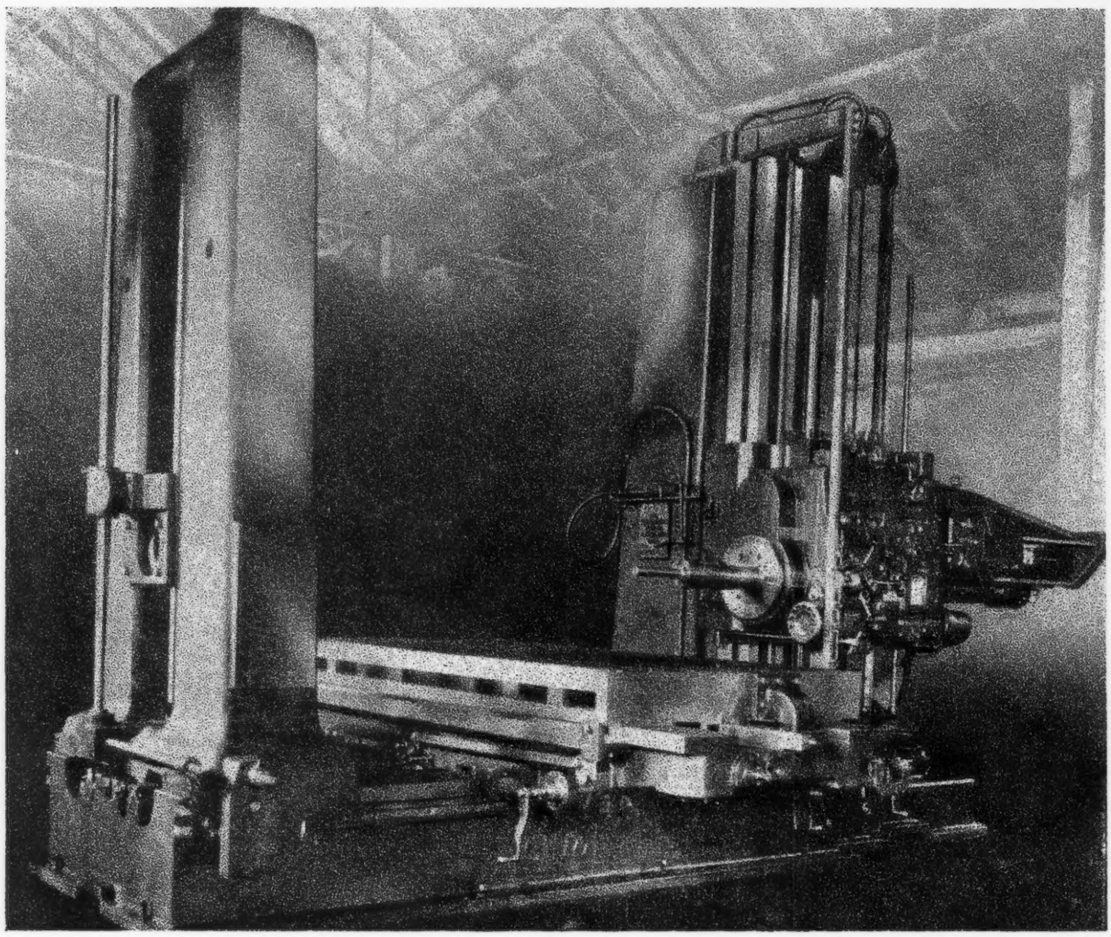
Manufacturers of Multiple Driller and Tappers

835 GREEN STREET, ANN ARBOR, MICH.

Where a large number of workers, such as are needed in our plants, handle the operation of machine tools, no other procedure than the procurement of safe tools can be followed. Such procedure pays in every way, and, of course, it is the humane thing to do. Electrical apparatus has helped materially in perfecting safety devices, and perhaps is the one single thing that has done more than any other de-

The careful procedure followed by the Ford Motor Co. in purchasing machine tools is outlined by Mr. Wibel as follows:

1. The need of a new tool is first brought to notice by certain shop conditions, such as the necessity for making a new part or for improvement in existing equipment, increased production, replacement of old equipment, and for other reasons.
2. A form is made out as the beginning of the machine tool requirement procedure.
3. Quotations are secured on machines suitable for the operation. The selection of the bidders may be caused by the initiative of the seller or it may be based on past experience.
4. Merits of the equipment being considered for the particular operation.
5. A final "recap" is made placing all pertinent data in simple form before us. Printed forms have been prepared for this purpose.
6. A decision is made as to the make and type of machine to be purchased, and often preliminary orders are placed prior to the actual formal order so as to save time.
7. Machine layouts and fixture drawings are approved by us.
8. Electrical equipment is specified and approved by the electrical division.
9. Motor dimension sheets and paint specifications are furnished the manufacturer. We have the machines painted to our standard so as to avoid repainting them upon receipt. Actual formal order is placed at this time.
10. Machines are followed through the follow-up division and determination of whether machine deliveries are going to be on schedule.
11. Necessary parts are furnished for testing machines as wanted.
12. Sample machine parts are submitted for our approval.
13. Machine is received and work order issued for installation at a location previously determined.
14. If the machine requires a demonstrator, this is supplied by the manufacturer.
15. Work from the machine and the function of the machine are approved and the machine becomes part of our machine tool family.
16. In the meantime, copies of the machine tool orders have been sent to the various interested departments. A permanent inventory of the machine has been made and entries have been placed in all of those machine tool records that play a part in the history of our entire group of machine tools.



OHIO Dreadnaught Table Type Horizontal Boring, Drilling and Milling Machines are presented in two sizes having 5-in. and 6-in. spindles. Net weight of the 6-in. machine illustrated is 80,000 lb. Equipped with thread chasing attachment for threads from 2 to 28 per in. Planer or floor type or table type furnished. (Ohio Machine Tool Co.)

vice to protect the workman. While the various States have rigid safety laws, we feel that the automobile industry has been much in advance of such legislation in doing everything possible to guard its employees at work. Machine tool designers must keep safety features in mind if their tools are to be desirable to machine tool buyers. We have in our plants a safety division that majors in trying to make machine tools safer.

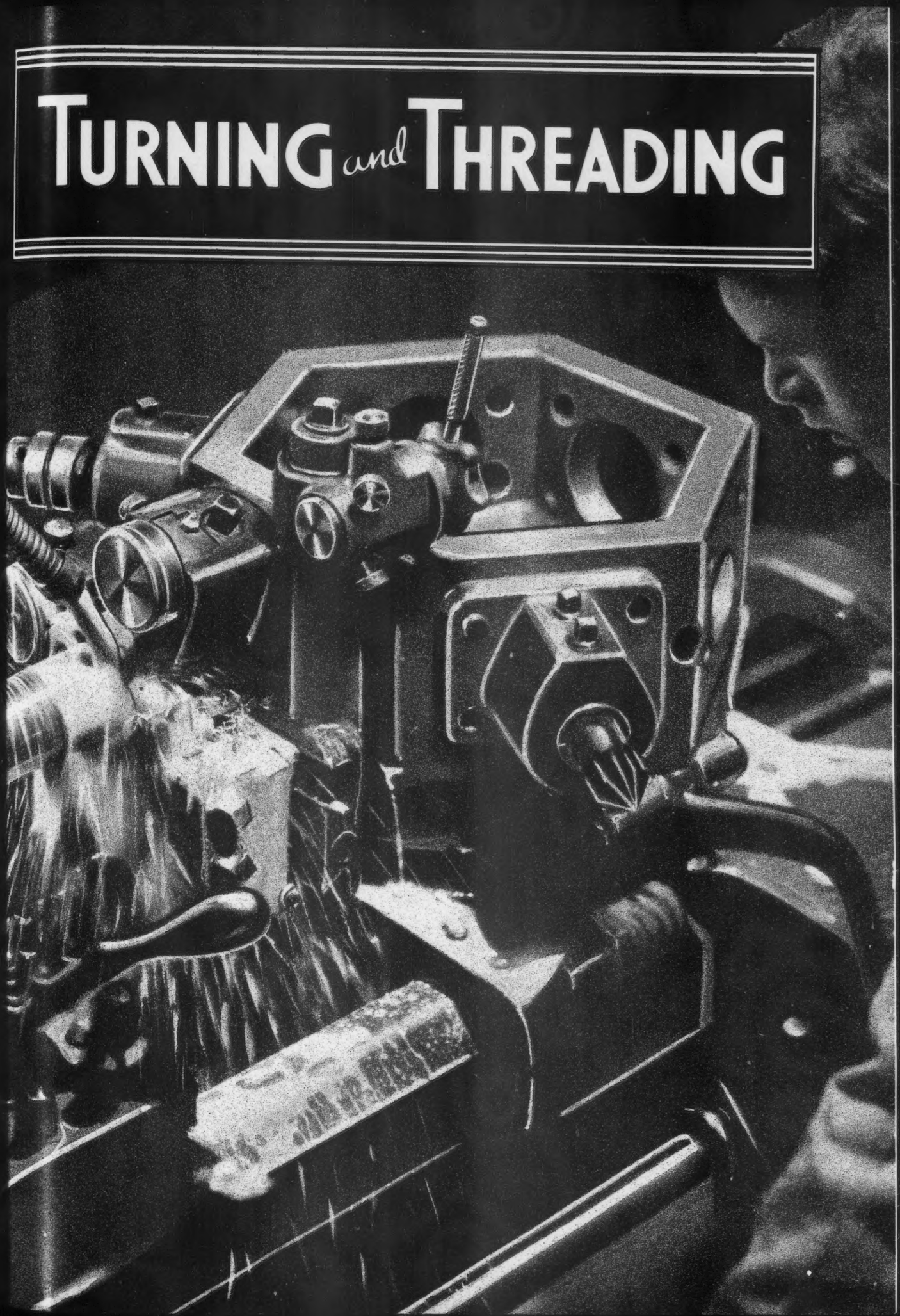
Standardization is looming larger each year with relation to parts of machine tools. Tapers, as well as the gearing, bolts, nuts, pumps and other types of equipment, are more simplified than they used to be. If the machine tool designer keeps before him the idea of standardization wherever possible, he helps the user by making the maintenance problem easier. He incidentally helps himself, because the machine tool buyer will be quick to determine for himself how much the equipment builder has done along these lines. We recently purchased cylinder boring machines from three different companies, each of which had to use certain parts from the other two. It may seem strange, but these machines went together in fine shape and caused no trouble. Standardization of parts and practice was responsible. Think of the types of tapers used today as compared to the various kinds employed at one time or another. Formerly there were approximately seven different kinds of tapers used, the variation in them being only slight.

Purchase Is Centralized

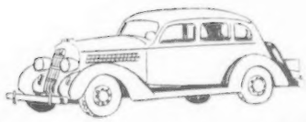
Purchase of machine tools for the entire Ford industries is centralized largely through the offices at the Rouge plant. This centralization of buying tends toward standardization, elimination of excessive repair stocks and in many other ways contributes to a more satisfactory buying procedure. In certain cases foreign-made machine tools are installed in foreign plants, but only where it is felt that they are as good as can be secured anywhere for the particular job. Ford ships many machine tools abroad

(CONTINUED ON PAGE 152)

TURNING and THREADING



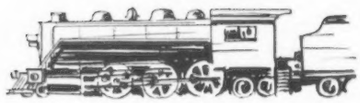
Agricultural Machinery Builders



Motor Car and Accessories Manufacturers

Motor Manufacturers

Tractor Manufacturers



Locomotive Builders

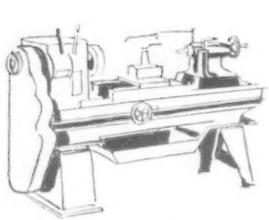
Bottle Makers

MEN OF MANY PRODUCTS

You'll meet them at the Machine Tool Exposition in Cleveland, Ohio, September 11-21, 1935. They will attend to see in operation the modern tools for industry, to keep step with industrial progress. They will find it profitable to visit the LeBlond Booth No. 1001. Whatever your business, the LeBlond exhibit will touch it at some point, and the experience of 50 years of successful machine tool building will be at your service.

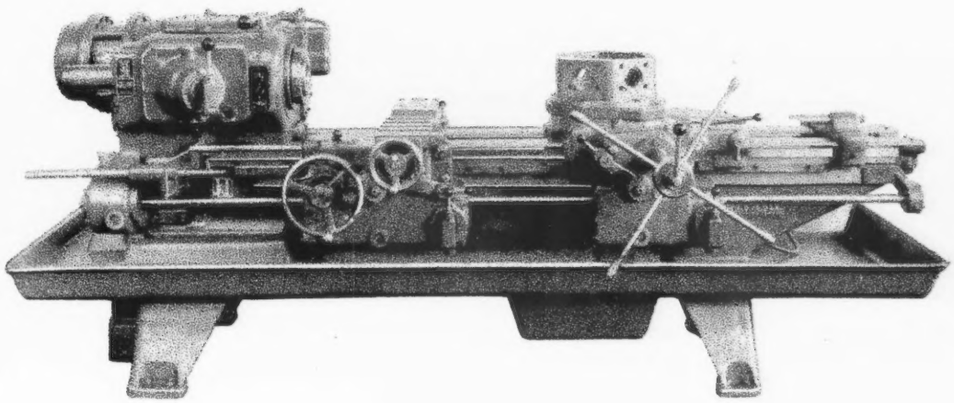
Refrigerator Manufacturers

THE R. K. LeBLOND MACHINE TOOL CO.
Cincinnati, U.S.A.



Vocational Schools

TURNING AND THREADING



AT LEFT

JONES & LAMSON Saddle Type Turret Lathes are built in 2½-in. bar capacity and fitted with 12-in. chucks when for chuck work. They have single-lever speed and feed selectors with direct reading dials and 12 spindle speeds, forward and reverse. Automatic lubrication. (Jones & Lamson Machine Co.)

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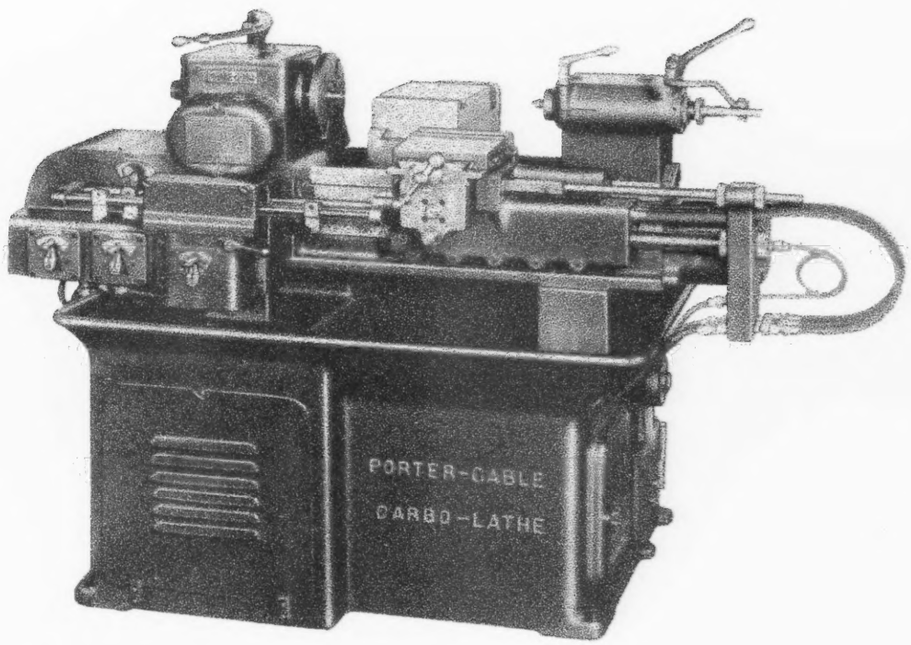
AT RIGHT

PORTER - CABLE Carbo Hydraulic Lathe is a full automatic cycle lathe designed for the duplicate manufacture of small or medium parts. One of its new features is hydraulic feed to cross slide of front carriage. Spindle speeds from 95 to 1130 r.p.m. (Porter-Cable Machine Co.)



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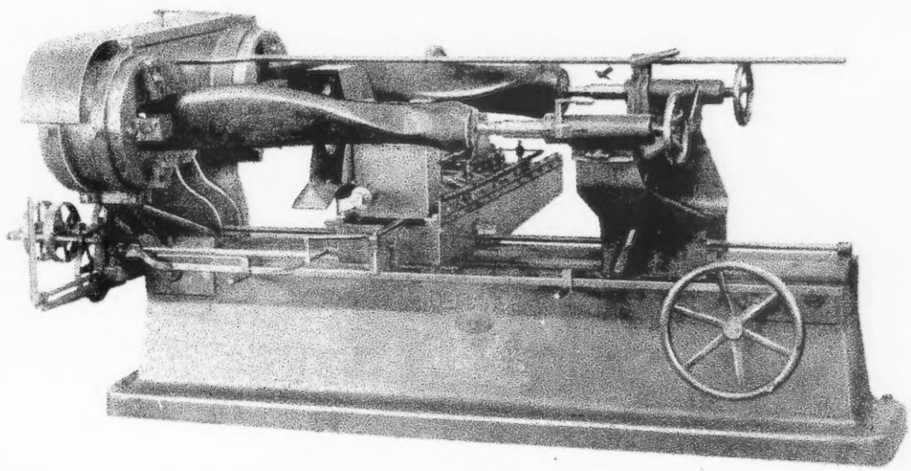

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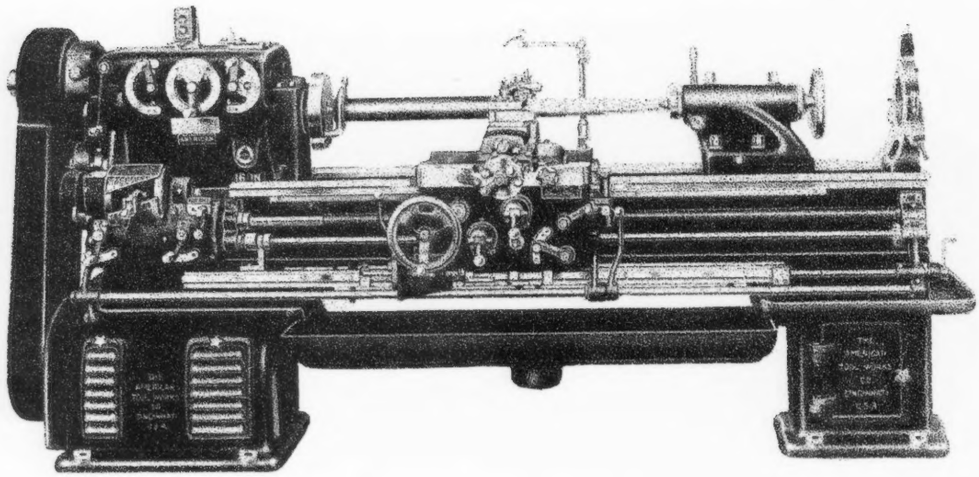
AT LEFT

DEFIANCE No. 613-C Aluminum Aeroplane Propeller Lathe is designed for turning the flat, winding portions of aluminum or wood propellers and struts. It is the latest adaptation of the Defiance Copying Lathe and can be used for turning other irregular shaped parts. (Defiance Machine Works.)



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AT LEFT

AMERICAN Multi-Production Lathe was developed to fill the gap between the standard engine lathe and the single purpose automatic lathe. Designed and powered to take full advantage of cemented-carbide tools. (American Tool Works Co.)

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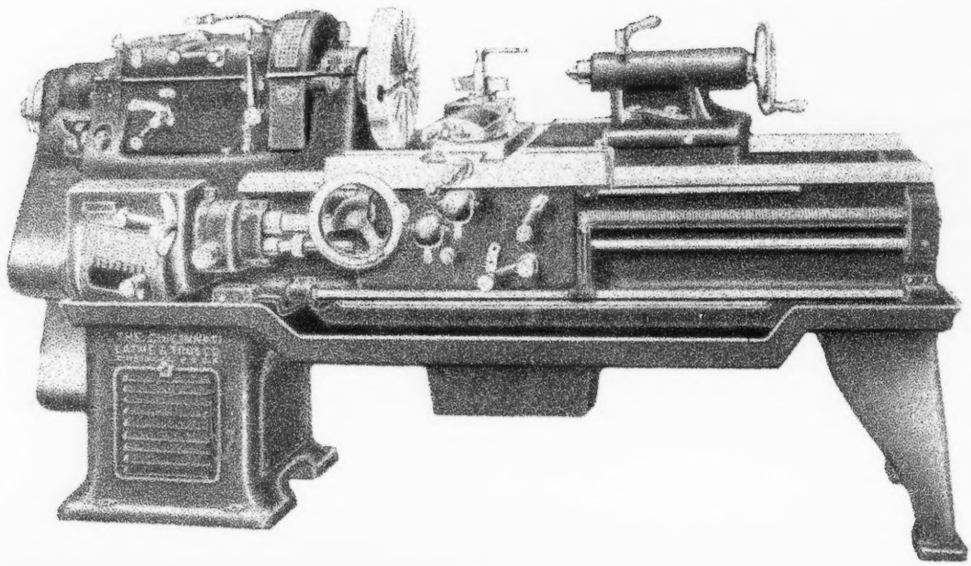

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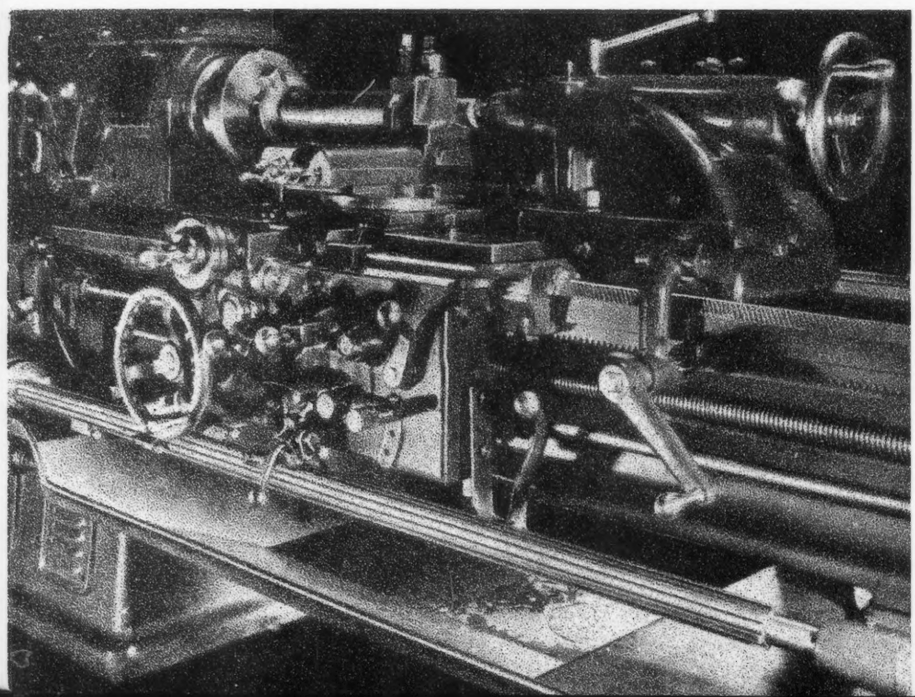
BELOW

MONARCH 18 in. by 48 in. Model C Timkenized tool room lathe is a new design which provides a complete tool room lathe. It is equipped with Monarch's new diameter and length gaging dials which eliminate "cut and try" methods. Automatic lubrication. (Monarch Machine Tool Co.)



ABOVE

THE bed of this lathe is made of 80 per cent steel with 1 per cent nickel to provide maximum wearing qualities. Heavy cross girths are spaced 15 in. apart. Twelve spindle speeds are obtained through three levers. Patented features include plunger for locking the main spindle when removing chucks and faceplates, use of which preserves accuracy of the head. Automatic force feed lubrication can be furnished. (Cincinnati Lathe & Tool Co.)

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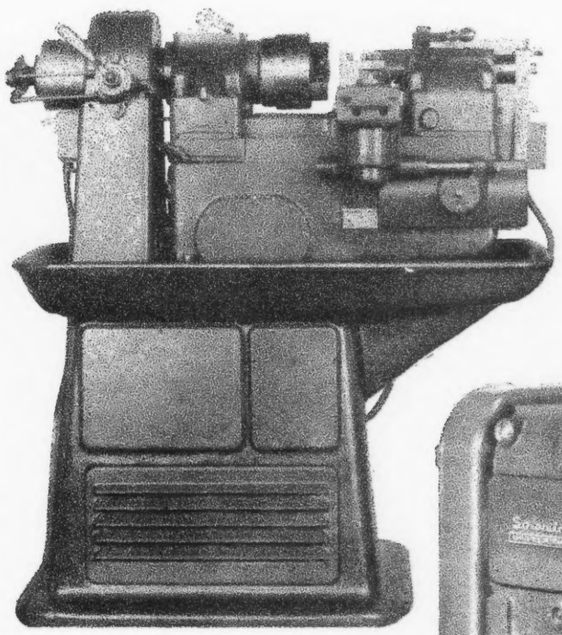

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AT LEFT

LO Swing Imp is designed for work that has been too small for the heavier automatic lathes. Spindle speeds up to 5000 r.p.m., vee belt spindle and feed drive. Wide adaptability for chuck and center work. (Seneca Falls Machine Co.)

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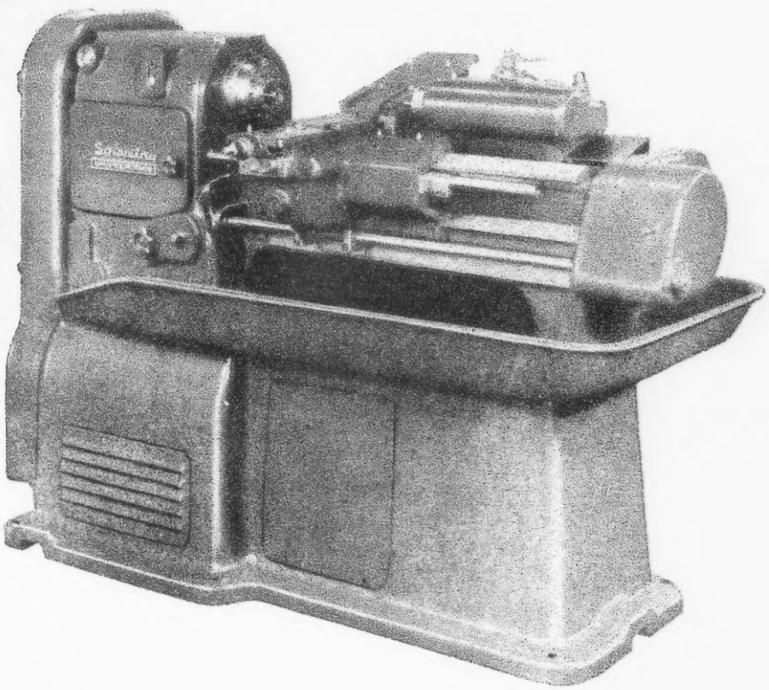

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AT RIGHT

LO Swing Unit Lathe is designed and built on the unit principle. Standard and interchangeable functional units provide versatility which ranges from plain turning to full automatic operation. (Seneca Falls Machine Co.)

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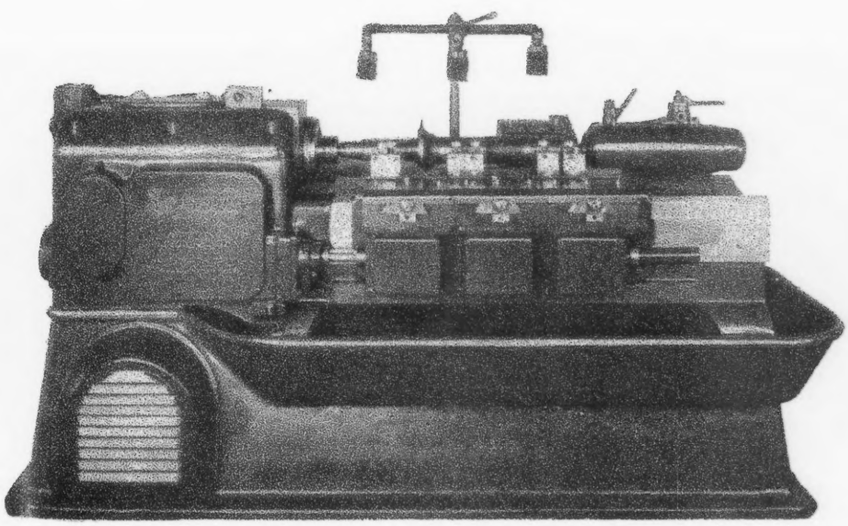

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AT LEFT

LO Swing Model U Automatic Lathe is designed for the completely automatic turning of pistons, bushings, stem pinions and a wide variety of similar work. Can be used for straight turning, forming or combinations. Economical for small lots. Made with 5-in. swing and in 12-in. and 36-in. center lengths. (Seneca Falls Machine Co.)

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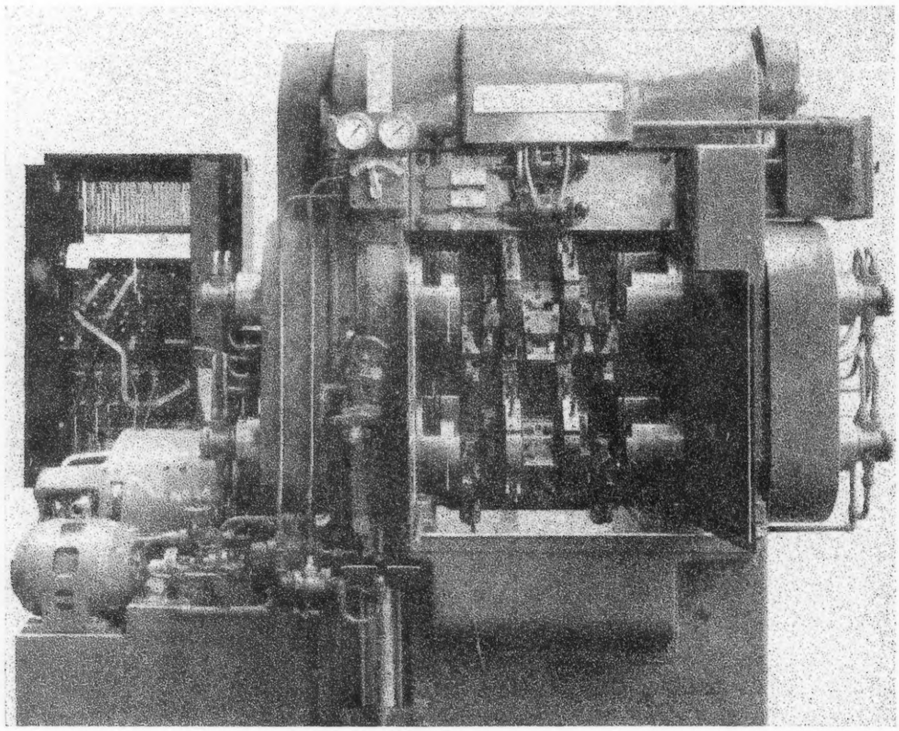

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AT LEFT

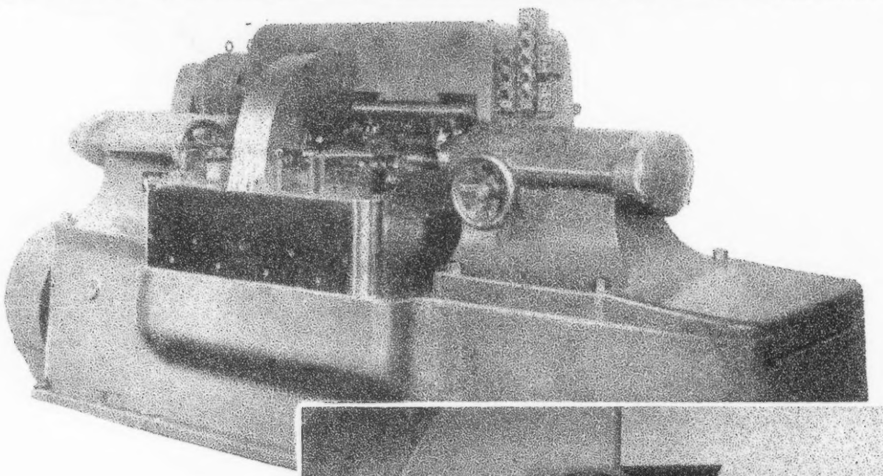
AUTOMATIC Double-End-Drive Crankshaft Turning Machine, designated as the Model 6AC, facing all webs of shaft on two spindles simultaneously. (R. K. LeBlond Machine Tool Co.)

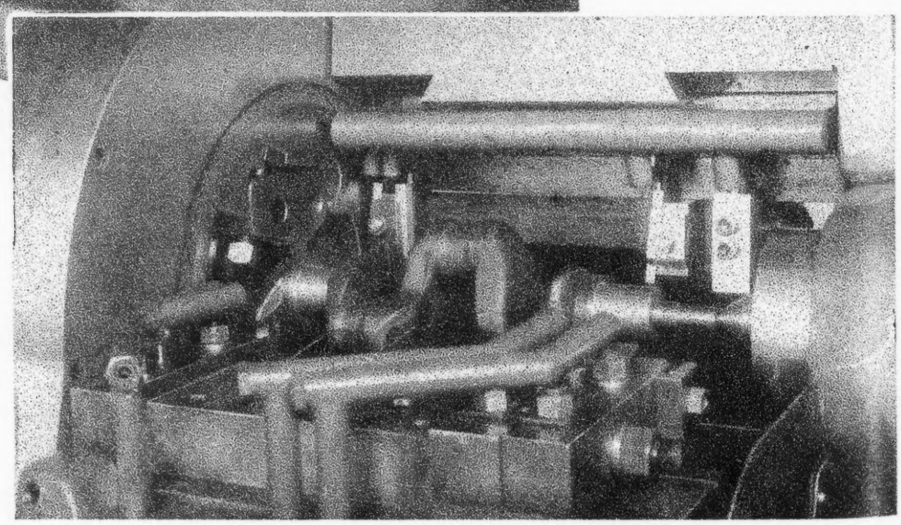
o o o

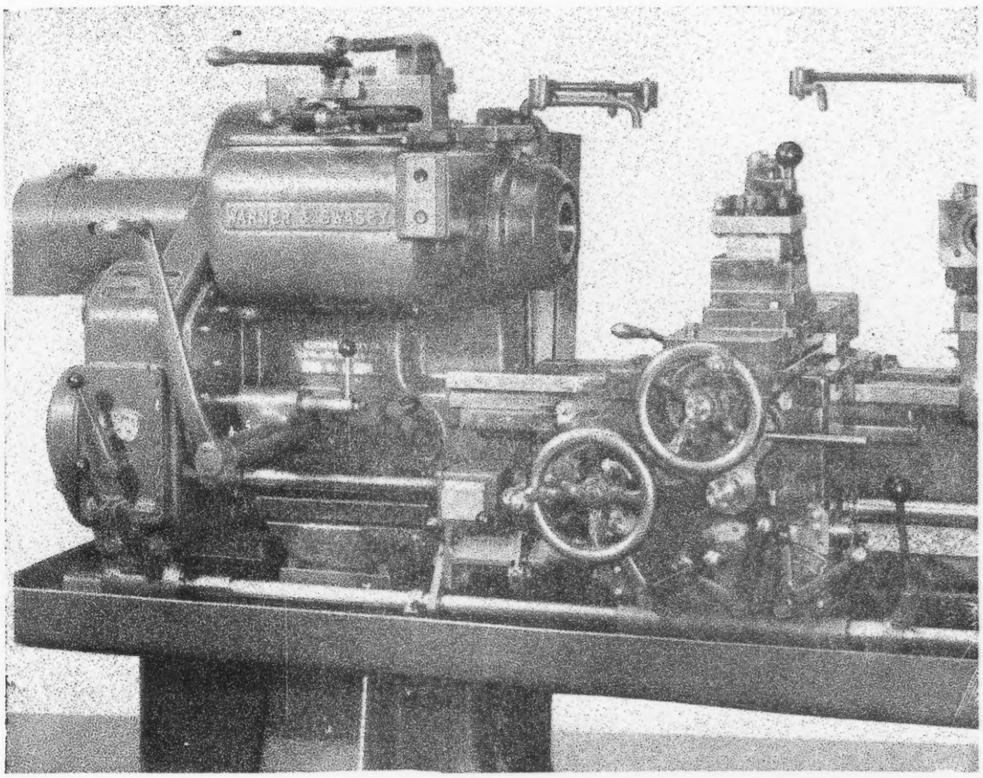
BELOW

WICKES Automatic Center Drive Model C Crankshaft Lathe is designed for cheeking, turning and filleting of all main line bearings, for turning and shouldering the stub ends, for turning and straddle facing the flange and turning oil grooves on four, six and eight throw cranks having three, four and five main line bearings. Electric control and complete automatic cycle. (Wickes Brothers.)

o o o







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AT LEFT

WARNER & Swasey Heavy Duty Universal Turret Lathes incorporate many improvements.

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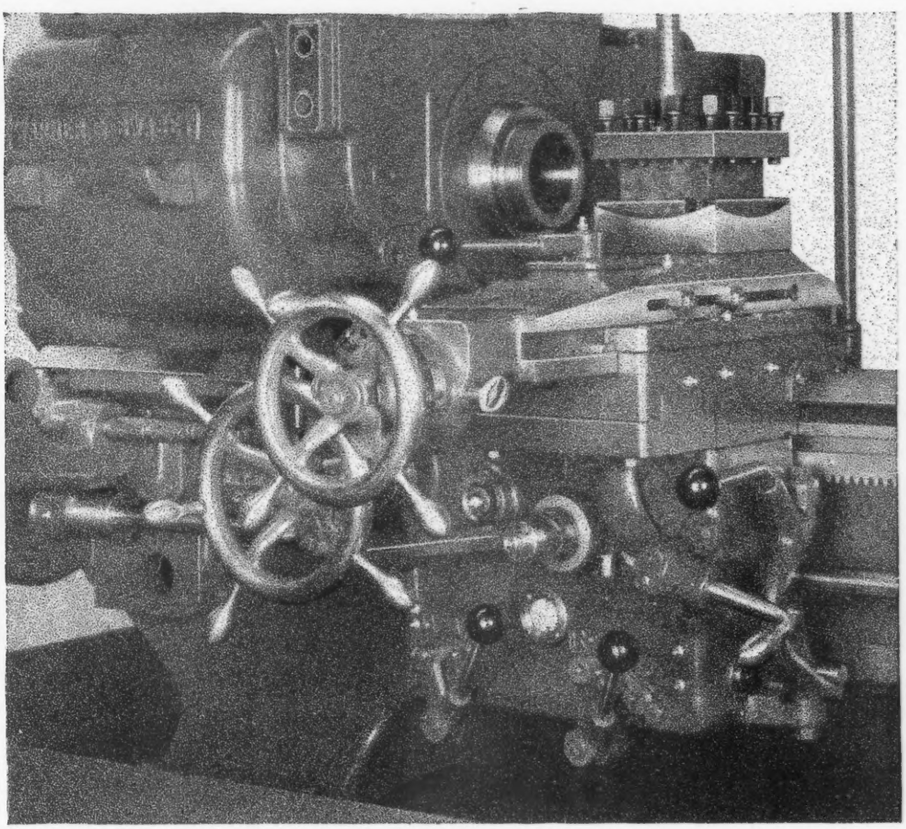
AT RIGHT

THE new W. & S. Turret Lathes have new heavy-duty cross slide carriages with square turrets. Also, the lead screws are of improved design.



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MONARCH WILL OFF

See the Monarch EXHIBIT . . .

THE Monarch Exhibit, at the National Show, is certain to arouse widespread interest and enthusiasm . . . because it will point the way to new standards of efficiency and economy. Monarch Machines have always been progressively modernized . . . until, today, they represent the very last word in productiveness, in economy and profit-making ability. Plan now to see the Monarch Exhibit, because many of the machines that will be on display are so new, so different, in both design and construction, that they will positively amaze you. These machines will be on display at the Monarch booth:

ENGINE LATHES

(1) 12" x 30" 16-speed lathe, in operation, powered with a 5 H.P. motor. This is the smallest machine in the Monarch line.

(2) 14" x 30" 16-speed Monarch model "AA" lathe, equipped with new diameter and length stops, and tooled on a production chucking job similar to a large number of such lathes which have been placed in use during the last year or more.

(3) 16" x 30" Monarch model "W" lathe equipped with 7½ H.P. motor. This lathe is a new addition to the Monarch line.

(4) 18" x 48" Monarch model "BB" 16-speed helical geared Timkenized lathe equipped with 7½ H.P. motor. This lathe incorporates many new time-saving improvements only recently developed by Monarch.

(5) 20" x 48" Monarch model "M" 16-speed helical geared Timkenized lathe with a 15 H.P. motor. It is equipped with all the latest time saving features and will be used, for the most part, on large diameter motor shaft production.

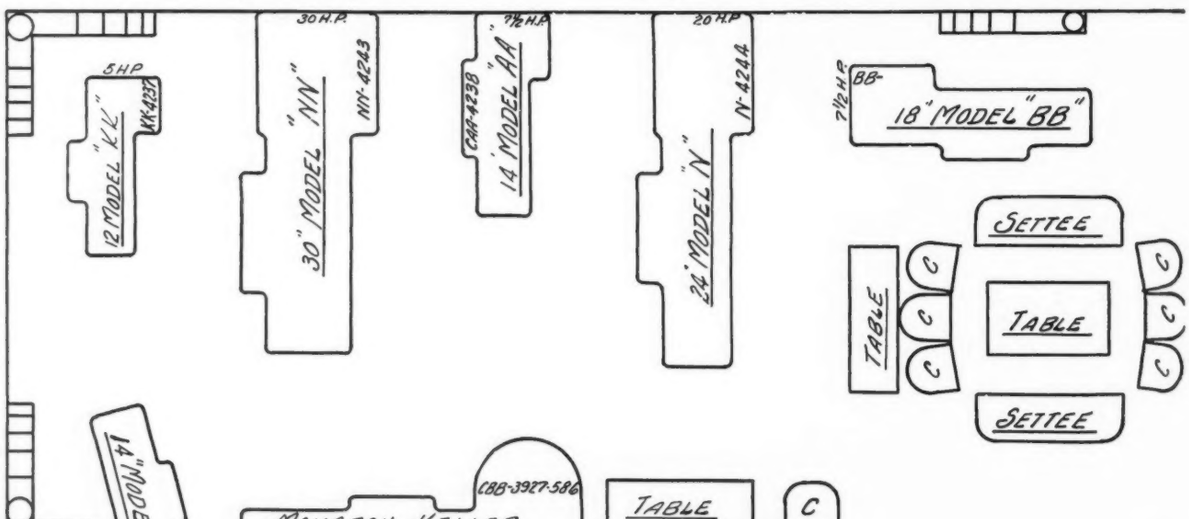
(6) 24" x 60" Monarch model "N" Helical geared Timkenized 16-spindle speed lathe with 20 H.P. motor.

(7) 30" x 60" Monarch model "NN" heavy duty lathe, 16-speed helical geared Timkenized powered with a 30 H.P. motor. This is another new addition to the Monarch line.

MONARCH TOOL ROOM LATHES

(8) 12" x 30" 16-speed helical geared Timkenized tool room lathe, with all the latest features.

(9) 14" x 30" model "C" 16-speed helical geared Timkenized tool room lathe with every new feature.



THE MONARCH MACHINE TOOL COMPANY, Sidney, Ohio, U. S. A.

New York Sales Office:
413 Graybar Bldg.

Monarch Lathes
Helical Gears - Timken Bearings
SMOOTHER . . QUIETER . . MORE POWERFUL

Chicago Sales Office:
622 W. Washington Blvd.

ER MANY SURPRISES AT THE NATIONAL SHOW!

(10) 16" x 30" Monarch helical geared Timkenized tool room lathe equipped with 5 H.P. motor and many new and improved features.

(11) 18" x 48" model "C" helical geared Timkenized complete tool room lathe. The Monarch Centrode Device and Oval Chuck for turning innumerable shapes other than round, will be featured on this machine.

(12) 14" x 30" Monarch Magna-Matic double carriage automatic lathe with a 10 H.P. motor. This lathe will be shown on automatic step shaft turning. It will not only feature the rapid floor-to-floor production of step shafts, but will also feature the quick set-up in changing from one job to another.

(13) 14" x 18" Magna-Matic Double Carriage Automatic Lathe, tooled for multiple tooling. It will be shown on production jobs to demonstrate not only the ease of tooling on this newest of automatic lathes, but also the rapid floor-to-floor production obtained.

(14) Monarch 12" x 18" simplified Manufacturing Type Lathe. This machine will be shown, for the first time, at the Cleveland Show. This is an extremely simple, yet very rugged and powerful manufacturing type lathe equipped for semi-automatic production and with rear facing carriage when desired. The lathe will be powered with a 5 H.P. motor, but will handle up to 10 H.P. It is of such a unique design that all accessory units can be applied to the lathe in the customer's plant should they be required at any time in the future. Its unique simple design, and the extremely low price, at which it will be offered, are sure to make this lathe one of the sensations of the Show!

(15) 18" x 48" Monarch Keller Automatic Form Turning and Boring Lathe in actual operation. This is the machine with the "Electric Brain" that has created such a sensation all over the world since its introduction four years ago.

(16) 18" x 48" model "BB" Shaft Turning Lathe, equipped with a 20 H.P. motor and a speed transmission unit inside the headstock leg, giving a very wide range of spindle speeds. This lathe has been developed solely with the idea of handling the new Tantalum Carbide turning tools on steels to their limit. It will be operated at spindle speeds as high as 2000 RPM and will be shown machining motor shafts on a production basis.

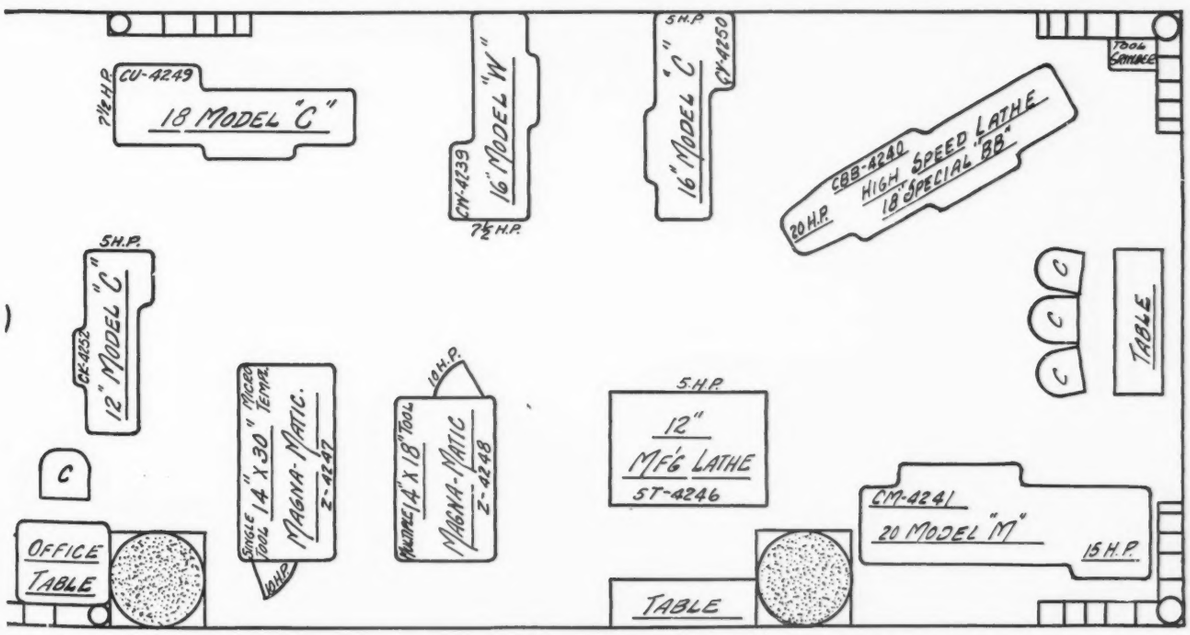
★

The new Cam Lock will be shown for the first time. It will be furnished as regular equipment on all sizes of Monarch Lathes—from 12" to 18", inclusive, for quickly clamping chucks, plates and fixtures to the flanged spindle nose.

Monarch's new Diameter and Length Gauging Dials, which eliminate "out and try" in lathe production, will be featured on all Monarch lathes shown. This is an entirely new Monarch development, and has been most enthusiastically received by those few lathe users who have had an opportunity of seeing it during the past few weeks. We consider this feature one of the most outstanding Monarch developments during the past year or more.

All Monarch lathes shown at this Exhibit will be equipped with Monarch Automatic Force Feed Lubrication to bed ways, tool slides, and aprons.

In line with Monarch's policy of constant pioneering and research, the result of the past several years of development in better materials for lathe beds will also be shown. In addition to showing the regular semi-steel, nickel, chromium lathe beds, there will also be on display, at the Monarch Exhibit, a hard chromium plated lathe bed . . . an all welded steel lathe bed with welded tool steel ways . . . and still another lathe with attached hardened tool steel ways.



THE MONARCH MACHINE TOOL COMPANY, Sidney, Ohio, U. S. A.

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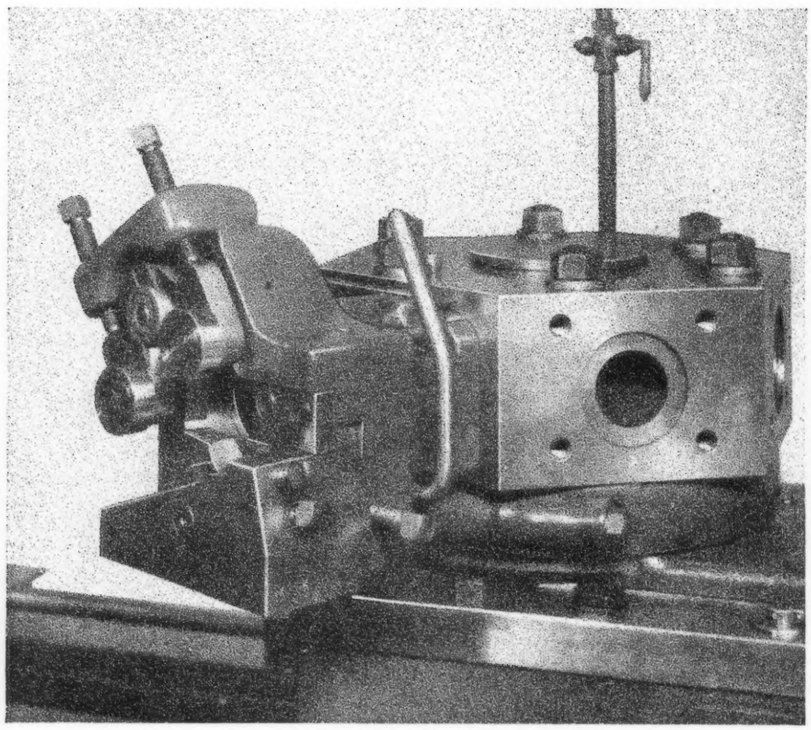

AT LEFT

THE beds of the new Warner & Swasey Turret Lathes are heavier, as is also the hexagonal turret construction.

o o o

BELOW

THEY are made in two sizes, 3-A and 4-A. Automatic bed-way lubrication is provided. (Warner & Swasey Co.)

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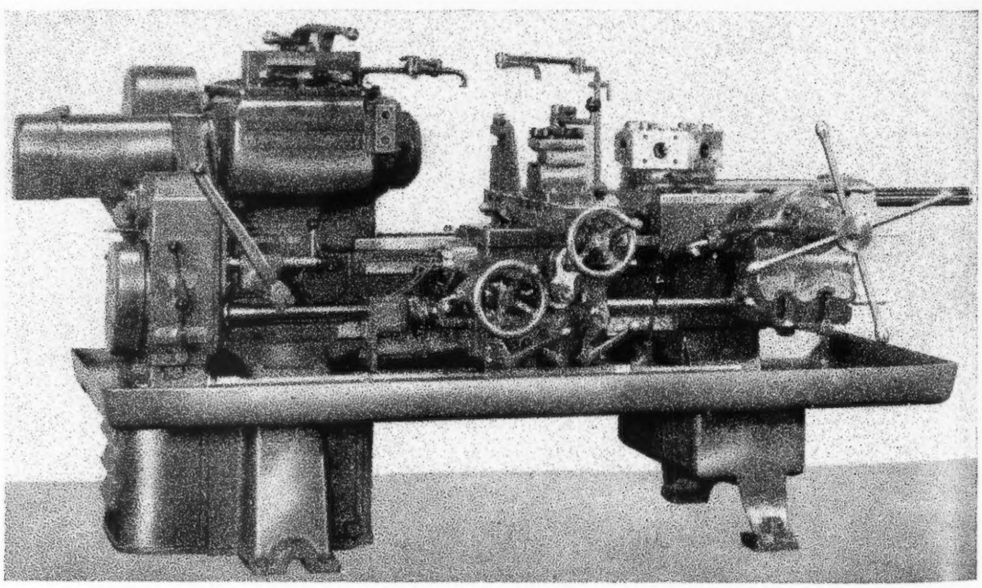

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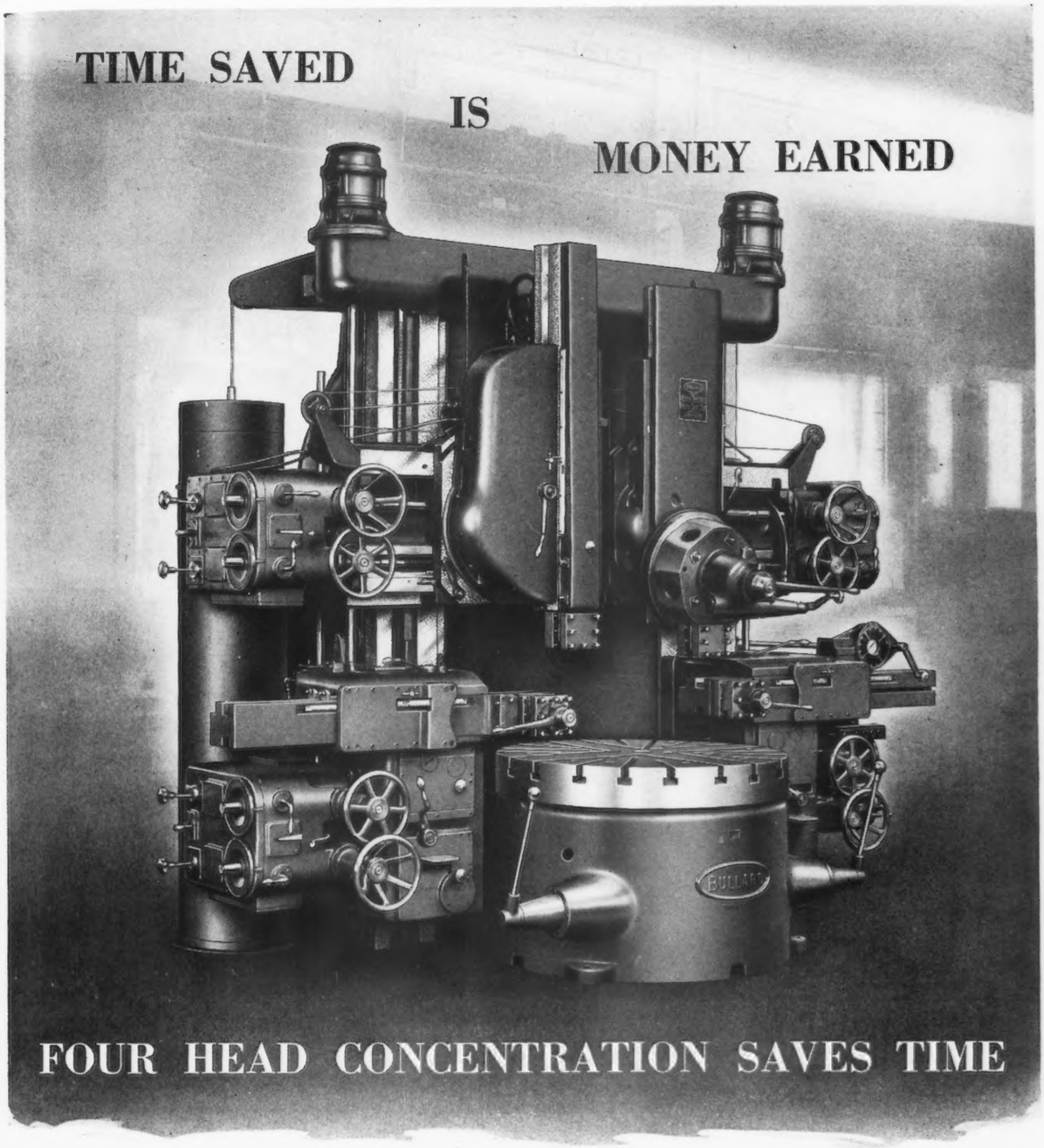
TIME SAVED IS MONEY EARNED



FOUR HEAD CONCENTRATION SAVES TIME

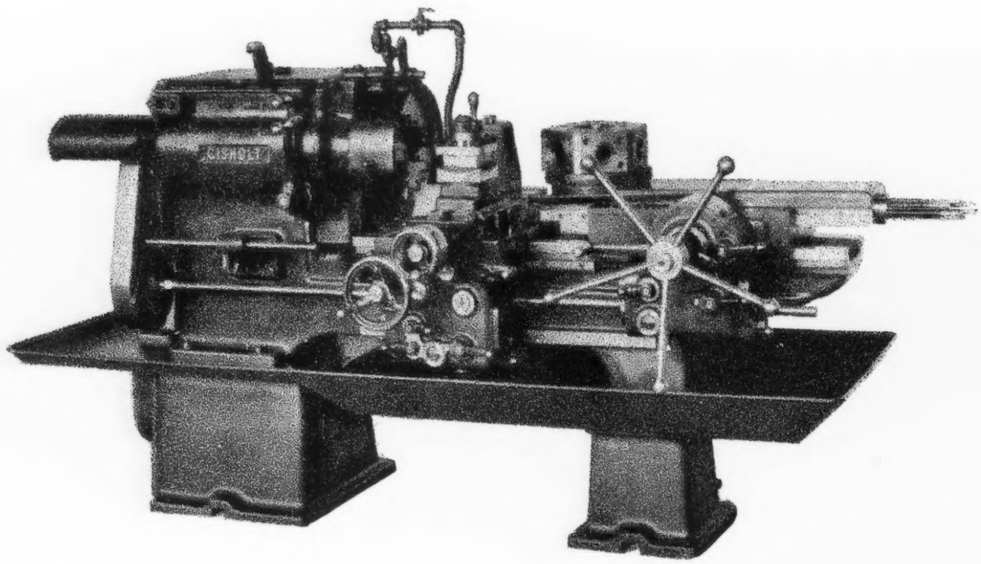
Properly distributed mass weight of Bullard Hydro-Shift Vertical Turret Lathes makes possible FOUR Head concentration of cutting without vibration.

Let Bullard Engineering Service tell you Why and How it is Profitable to buy completely Modern Equipment.

Hydro-Shift built in 46-56-66-76 and 86 inch sizes.

See the 56 inch machine do its paces at Bullard Booth 205—National Machine Tool Builders' Show—Cleveland Auditorium—September 11th to 21st.

Bridgeport **THE BULLARD COMPANY** **Connecticut**



AT LEFT

GISHOLT No. 3 Turret Lathe is an addition to the company's line and is for bar work up to 1½ in. diameter by 10 in. length and for chucking work to 18½-in. swing over ways. Six speeds are provided in two groups: high and low and a multiple disk clutch enables instant speed change between groups and speeds. (Gisholt Machine Co.)

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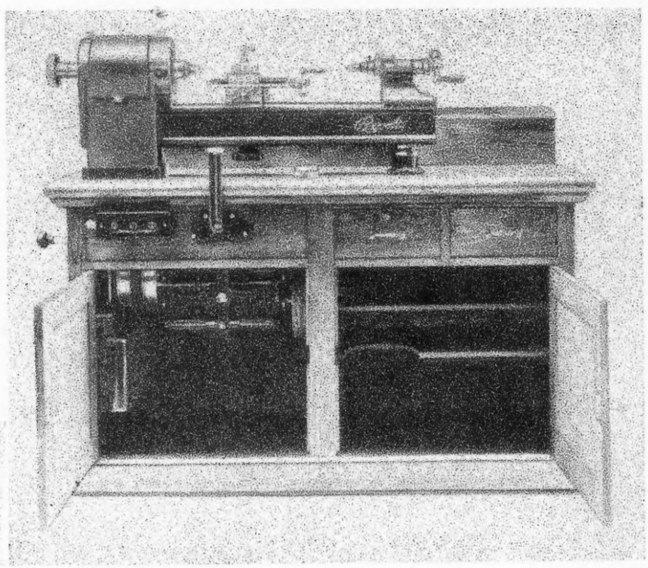
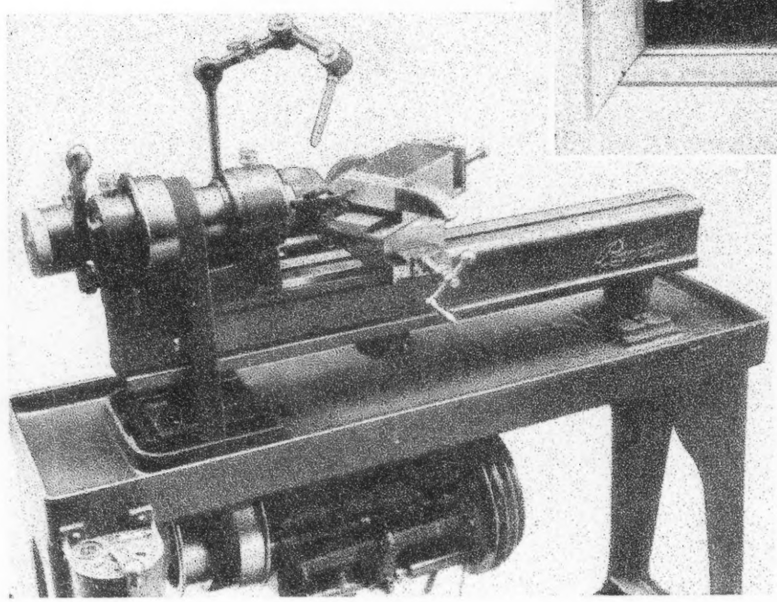
RIVETT Enclosed Head Roller Bearing Lathe is provided with jack pedestals and three point mounting, preventing distortion. Has automatic brake and hand lever control. Speeds from 190 to 2000 r.p.m. Speed box motor drive. (Rivett Lathe & Grinder, Inc.)





o o o

RIVETT Open Head Ball Bearing Lathe has roller bearing lever chuck closure, automatic universal slide rest and speed box motor drive with automatic brake and treadle control. Designed especially for fine finish with tungsten carbide on small duplicate parts. (Rivett Lathe & Grinder, Inc.)

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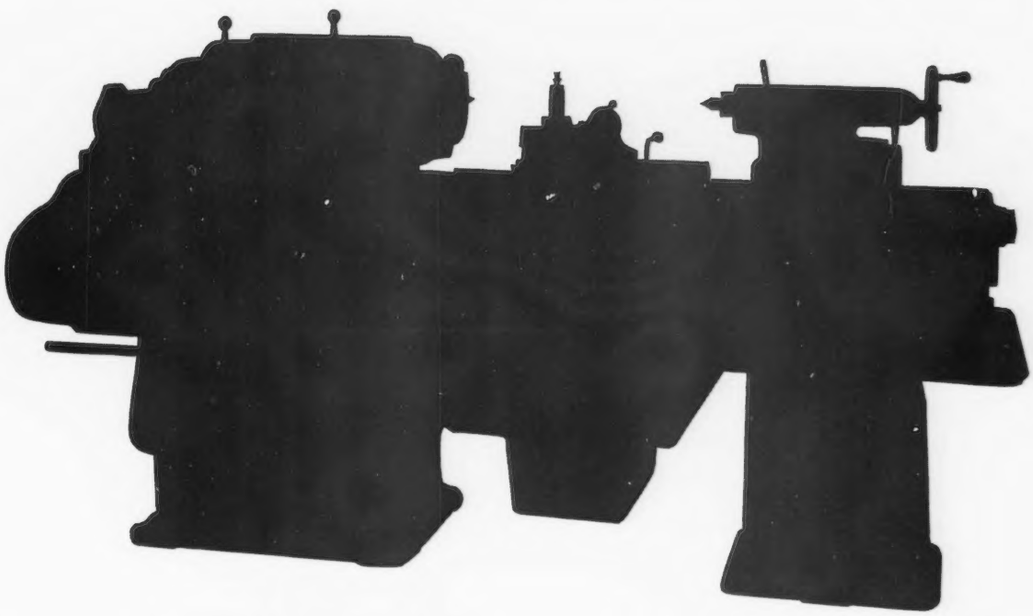
ANNOUNCING

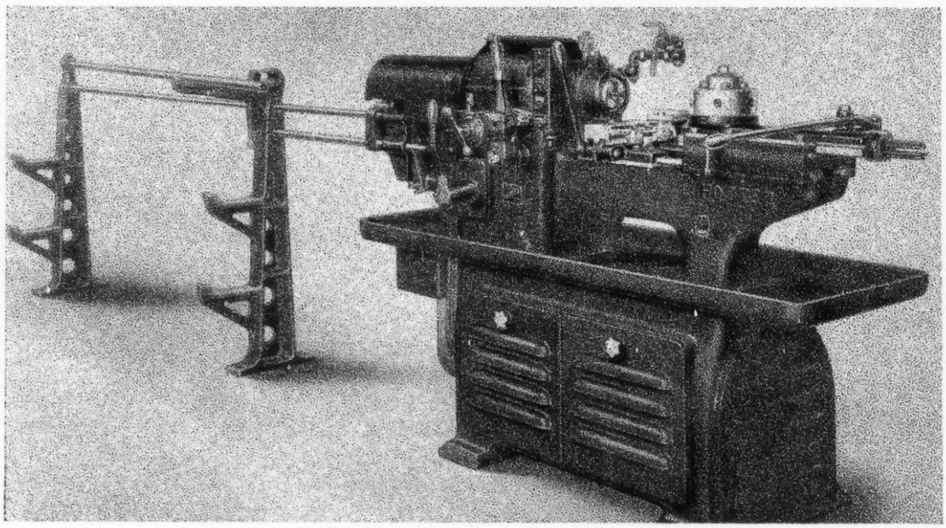


The NEW PRATT & WHITNEY
Model C Lathe

A SIMPLIFIED LATHE OF UNUSUAL ACCURACY, RIGIDITY AND CONVENIENCE

BOOTH **№ 906**

To be shown for the first time
IN CLEVELAND



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FOSTER No. 1 Turret Lathe for bar stock is equipped with automatic chuck with 13/16-in. diameter capacity which may be increased to 1-1/16 in. Eight dial selected spindle speeds are provided. New design incorporates increased speed, accuracy and rigidity. (Foster Machine Co.)

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FOSTER 1½-in. Universal Turret Lathe is designed to take advantage of the new cutting carbides. Also built for 2 and 2½-in. round bar capacity. Two ranges of eight speeds each for bar and chuck work. Hydraulically operated chuck and bar feed. Automatic indexing and lubrication. (Foster Machine Co.)

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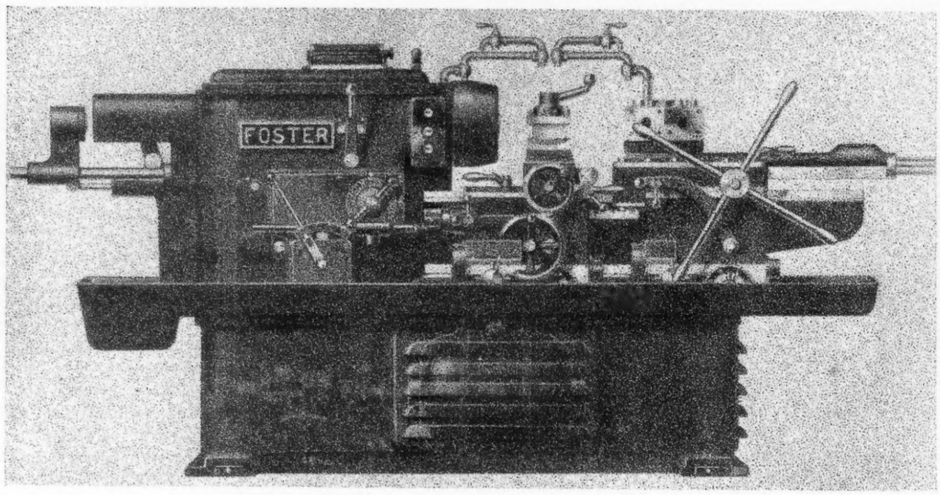

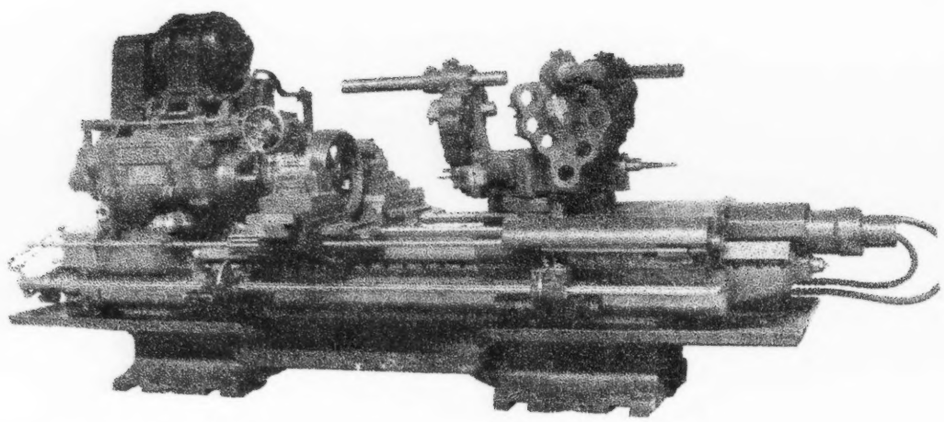

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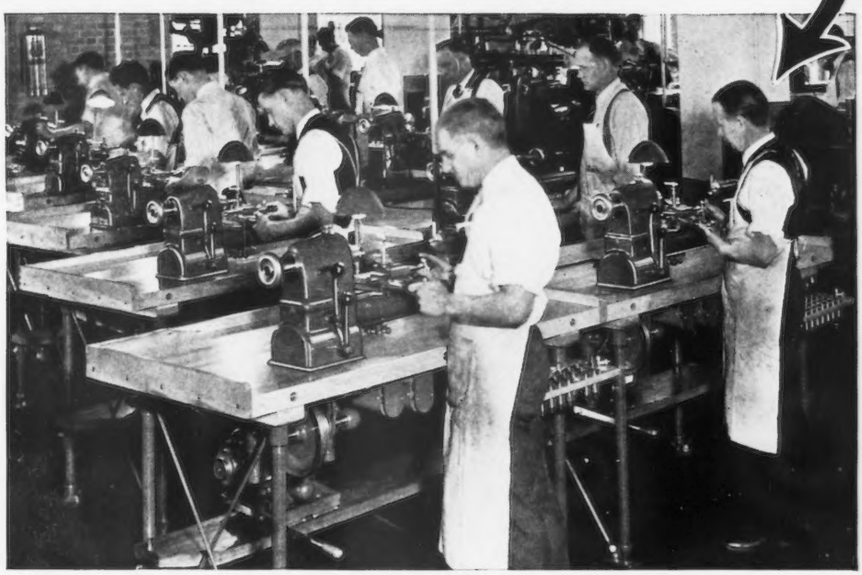
FOSTER No. 3-F Indexing Turret Type Fastermatic has nitrided ways Brinelling to over 1000. Sixteen changes of spindle speeds in sets of four automatic changes. Bridge-type cross slide may be used with any turret face. Hydraulic feeding and automatic lubrication. (Foster Machine Co.)

o o o

Look—First at This Picture . . .

Then—at This



HARDINGE
MODERN
BENCH LATHES
MILLING MACHINES
HAND SCREW MACHINES
PAY
DIVIDENDS

Section of Laboratory Tool Room — International Business Machines Corp., Endicott, N. Y.

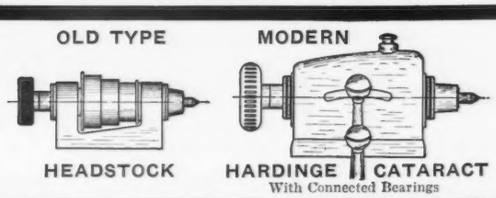
HARDINGE Cataract Precision Machines have an important part in the development and manufacture of Tabulating Machines, Time Recorders, Sound Systems and Electromatic Typewriters produced by the International Business Machines Corporation.

Modern Hardinge Enclosed Head Bench Lathes, Bench Milling Machines, and Hand Screw Machines are meeting their exacting demands in the inventing, development, laboratory, tool room and production departments.

The International Business Machines Corporation is acquainted with advantages of Hardinge machines. They are acquainted with the modern design for improved appearance, reduced equipment and up-keep costs and the elimination of overhead belting, shafts, countershafts, gears and clutches. **Are you fully acquainted with the possibilities?** If not, refer to this advertisement and ask for bulletins.

HARDINGE BROTHERS, INC.
ELMIRA, NEW YORK
CHICAGO • DETROIT • NEW YORK
Precision Machine Tools Since 1890

HARDINGE *Cataract* PRECISION



AT RIGHT

MURCHEY No. 22 Threading Machine has pre-loaded bearings throughout. It is motorized and has infinite speed change between 72 and 386 r.p.m. A spindle speed indicator shows exact spindle speed. (Murchey Machine & Tool Co.)

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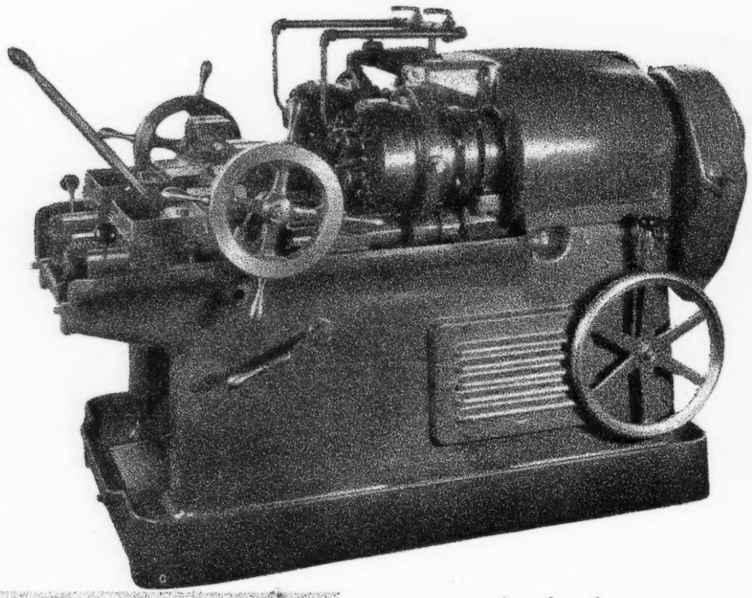

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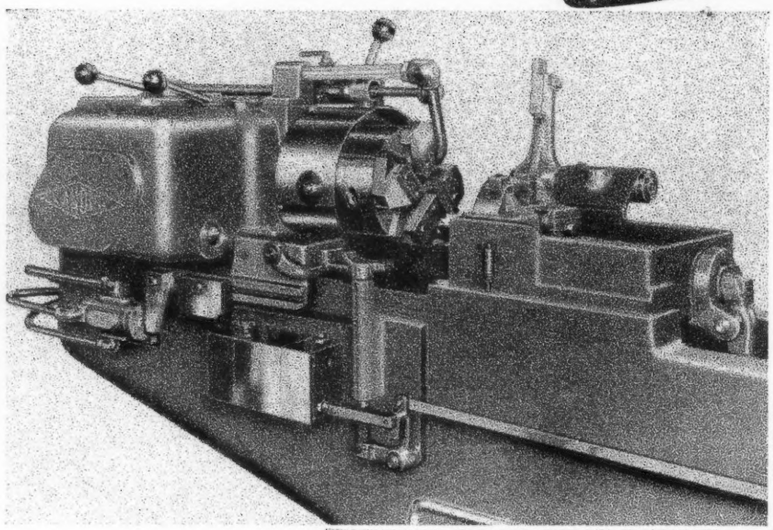

AT LEFT

LANDIS MACHINE CO.'s Lanhydro is the first threading machine built on a commercial basis using hydraulic control. This can be applied to an automatic magazine feed, carriage feed and return, work gripping, feed screw engagement, etc. (Landis Machine Co., Inc.)

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AT RIGHT

LANDMACO Work Holding and Centering Attachment has been developed for use on Landmaco threading machines. Attachment shown is for threading auto clutch gears with threads concentric with gear teeth pitch circle. Live center is used to obtain concentricity in this application. (Landis Machine Co.)

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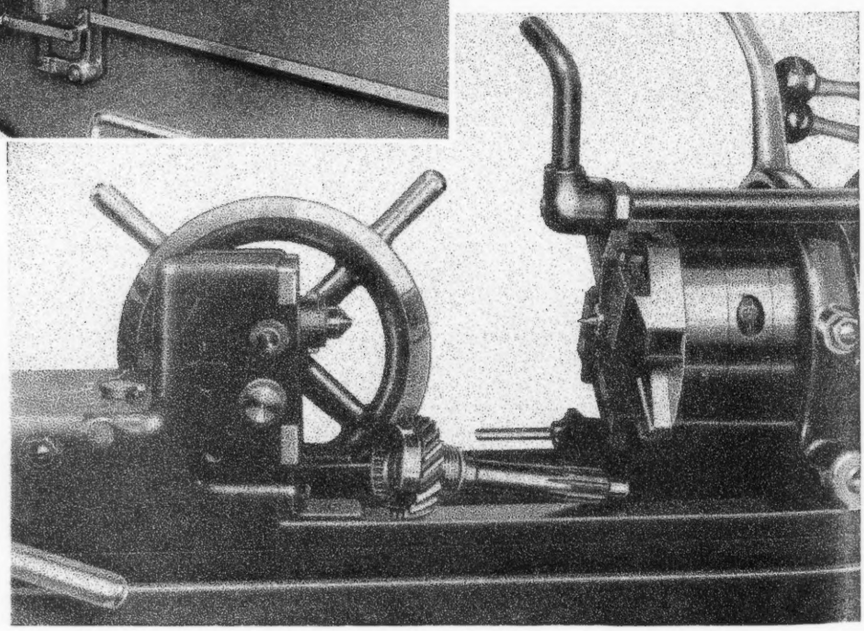

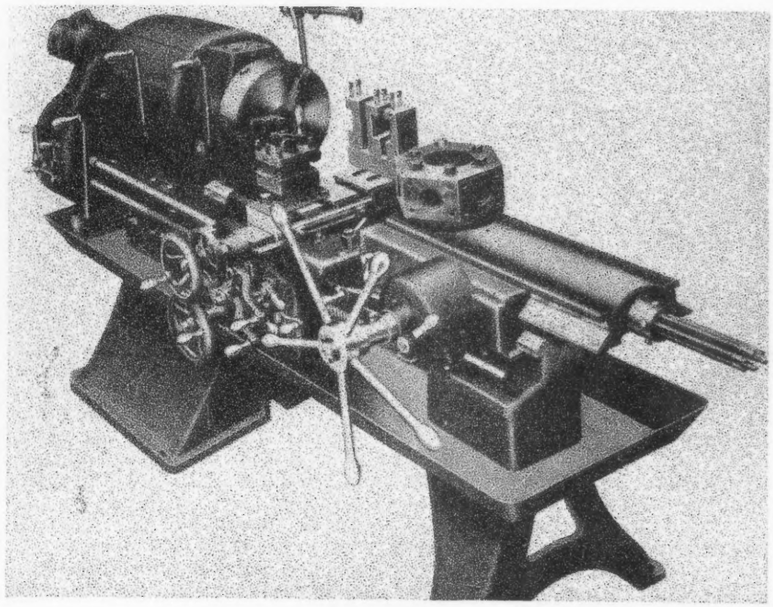

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TURRET Lathe for both small lots and quantity production. Rapid methods of chucking, by hydraulic, air or electrically operated chuck, can be furnished, and magazine chuck can be attached. Several headstock drive arrangements can be furnished, speeds from 22 to 1000 r.p.m. and highe.. Means for instantaneous speed changes are provided. Only one taper gib is required for permanent alinement and rigidity. (Millholland Sales & Machine Co.)

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AT RIGHT

HYDRATROL Lathe featuring hydraulically-operated speed changes by rotary selector valve, giving 16 forward and eight reverse speeds. Automatic slide rule indicates spindle speeds and cutting speeds in ft. per min. (Lehmann Machine Co.)

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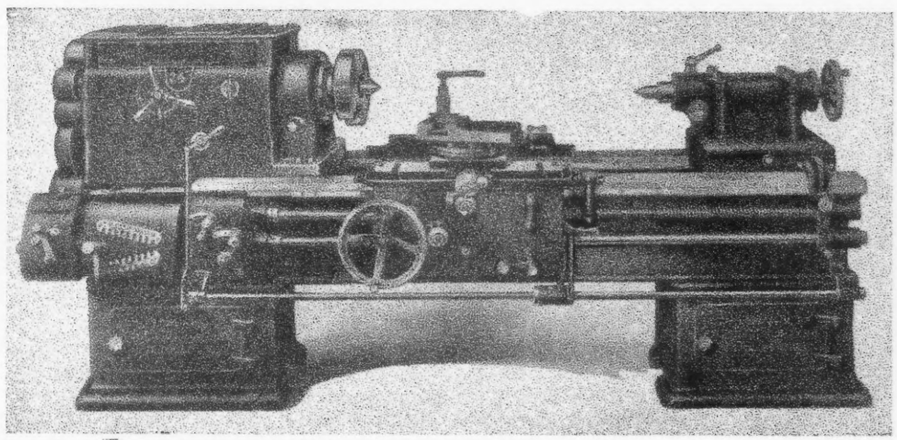

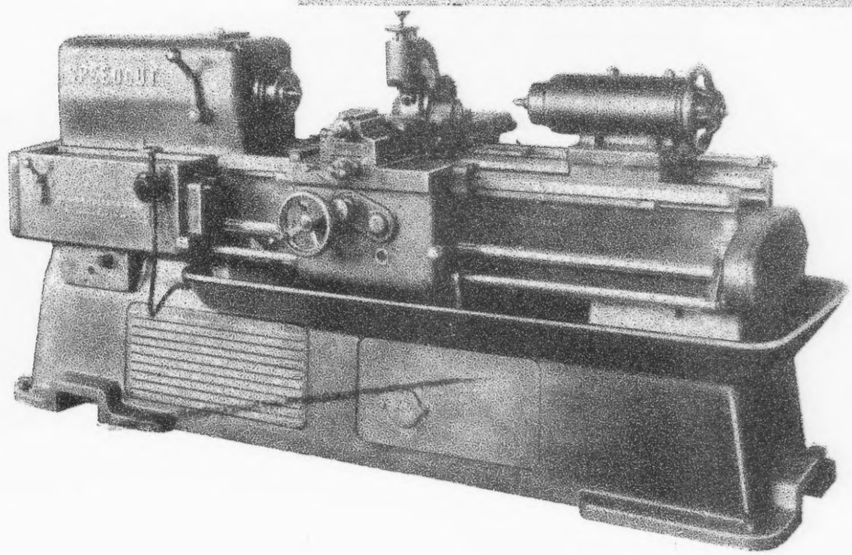

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LO-SWING Speedcut Lathe designed to permit maximum use of carbide tools in single-point turning or modified multiple-turning. The spindle, which is mounted in preloaded ball bearings and has no gears on it, is driven from a variable speed motor or Transitorque unit. Speeds up to 3600 r.p.m. are available. (Seneca Falls Machine Co.)

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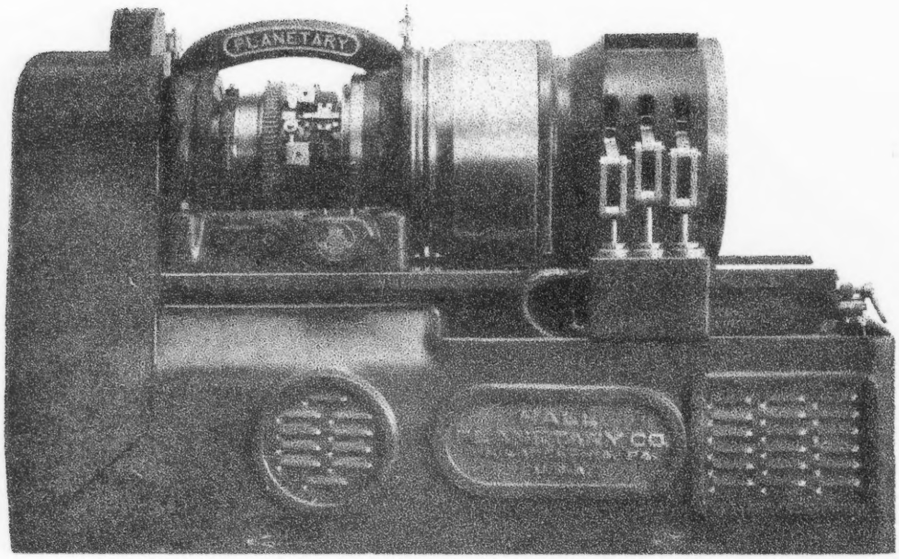

AT LEFT

HALL Planetary D-573-4 Single Head Pipe Threading Machine was built for a large steel mill for milling threads on pipe. The machine illustrated is guaranteed to mill the thread within 0.0005 in. as to lead over a 3⅜-in. length. Capacity, 2 in. to 18 in. diameter. (Hall Planetary Co.)

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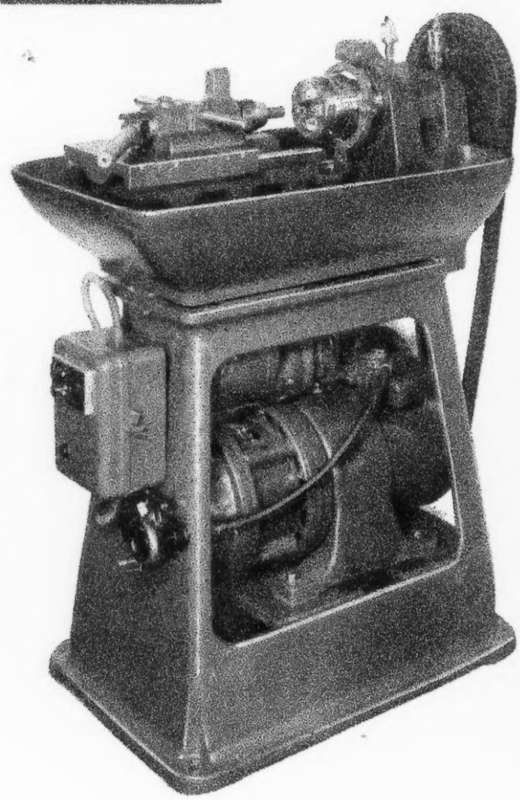

AT RIGHT

HAND G Threader, Model 2 has been designed to supplement the standard H and G threader. It is capable of handling larger work and more chip space is provided in the bed. Die heads up to 2-in. capacity may be used. (Eastern Machine Screw Corpn.)

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Appraising Machine Tool Replacement

(CONTINUED FROM PAGE 134)

which have been bought in the United States, and in numerous instances American equipment has been copied in foreign lands.

A detailed record is kept of every machine tool, showing its specification, costs, use, location and final disposition. A company operating 42,000 machine tools naturally is confronted with the problem of available equipment, equipment to be sold, equipment to be repaired and rebuilt, and equipment to be salvaged. Every machine, as it is delivered to our plants, is given a number which it carries during its life and which is never applied to any other piece of equipment. We maintain a constant check to find out whether all of these machine tools are in use.

Many years ago we conceived the idea that we should have a complete record of every machine tool with reference to repairs needed during its life in the shop and time lost on account of such repairs. This record proved burdensome and was discontinued after a short time. We still have such a record in a way, but it is in the minds of the foremen and maintenance men who are concerned from day to day with machine tools. These men know whether the equipment stands up, whether it continually needs repairing and, in a general way, whether it is too expensive to maintain. Fine machine tools certainly should be used with care. We emphasize this phase of our business and our shop organization is quick to detect unworkmanlike use of machines. Fine milled surfaces, such as ways and slides,

(CONTINUED ON PAGE 154)

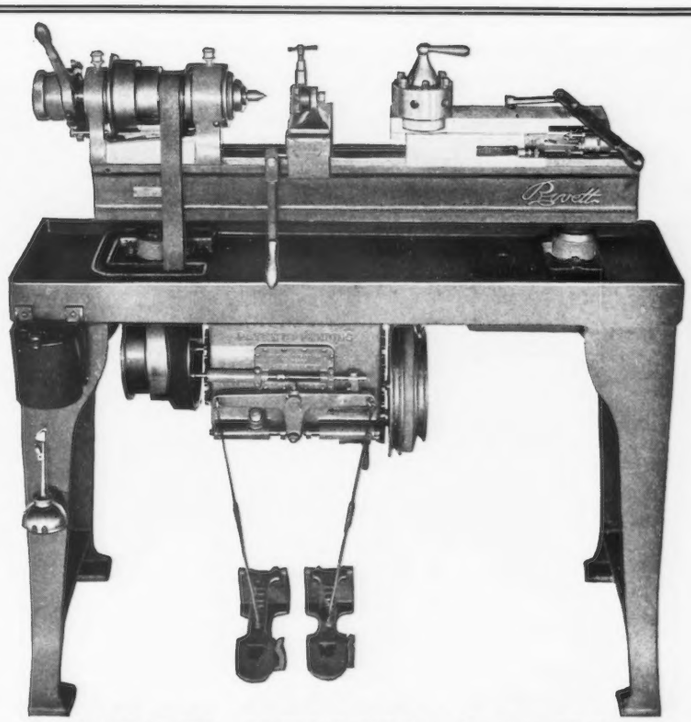
Three Series

Plain Bearing lathes for precision tool room and light manufacturing work are offered in five headstock sizes, collet capacities ½" to 1⅛". Attachments for precision thread cutting, thread chasing, milling, relieving, slotting, deep drilling, grinding, etc., etc. Countershaft or motor drives.

Roller Bearing lathes with open or enclosed headstock, Vee or flat belt drive have been developed to secure longer precision life under continuous heavy duty. 6-12 or 18 selective spindle speeds from 100 to 2300 r.p.m. are available.

Ball Bearing lathes are high production low cost machine tools for small bar or chuck work. 6-12 or 18 selective spindle speeds up to 4600 r.p.m. permit use of tungsten carbide or diamond cutting tools for hand turret and automatic slide rest as well as usual bench lathe operations.

RIVETT LATHE & GRINDER INC.
BRIGHTON, BOSTON, MASS.



RIVETT BENCH LATHES

BOOTH 1010

N.M.T.B.A. Show Cleveland, Sept. 11-21

SEE OUR EXHIBIT
AT THE
MACHINE TOOL SHOW

•

BOOTH No. 800

Manufacturers of

LATHES

and

SPECIAL MACHINERY

•

Iron Founders

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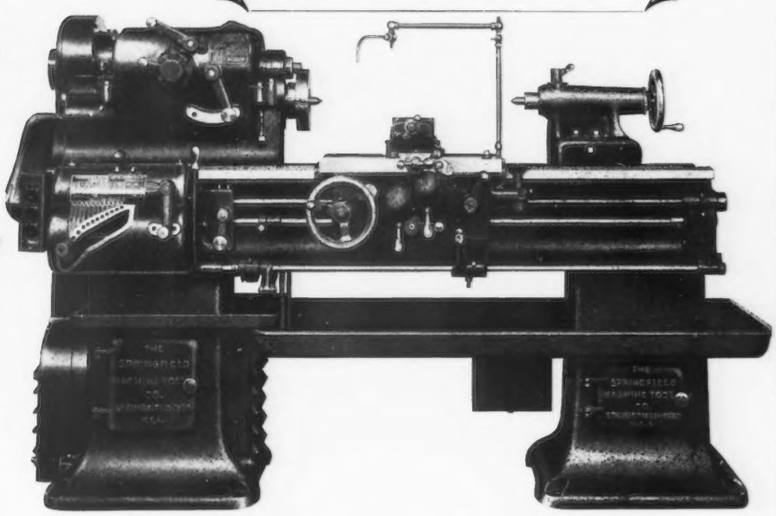
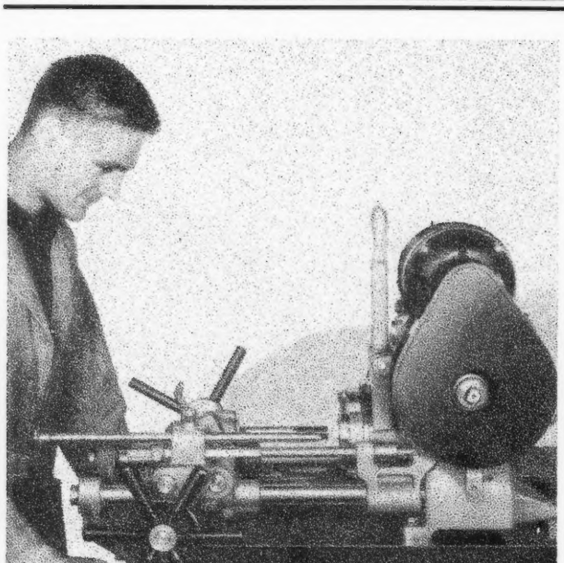
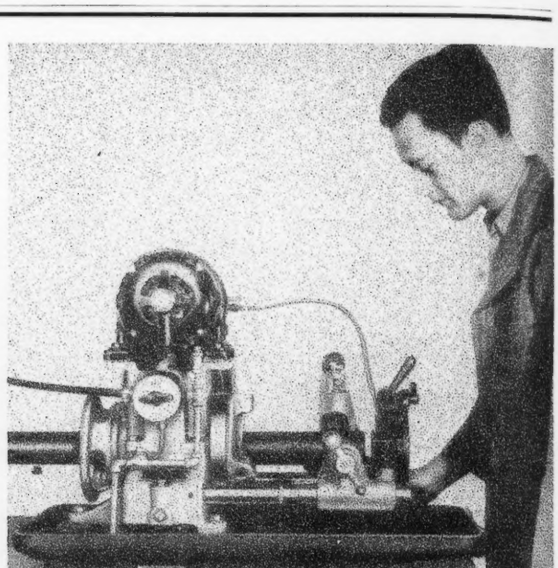


THE SPRINGFIELD MACHINE TOOL COMPANY

SPRINGFIELD, OHIO





IMPROVED Tom Thumb Pipe and Bolt Machine, for 1/2 to 2-in. pipe sizes, with flared base to increase rigidity and protect against threading oil loss. It now has rack and pinion feed for die head carriage, as well as thread length indicator. (Oster-Williams Co.)

(CONTINUED FROM PAGE 152)

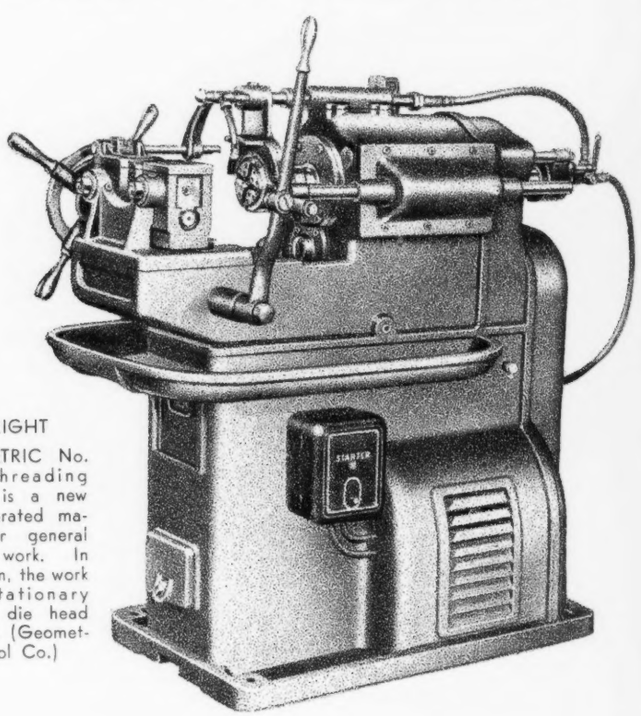
were not made for testing hammers and files.

Testing and Inspection Equipment

Testing and inspection machinery is daily playing a more important part in the automobile industry. Ford has many machines of its own design and manufacture which cut minute costs and make more efficient the testing and inspection of automobile parts. While these machines are for use on Ford parts, there is plenty of room open for the machine tool builder perhaps to get into this line. There may be broad principles which can be incorporated in machines of this type that can be utilized not only in the motor car industry, but also in related lines of manufacturing.

Since Ford has been in business, we have bought about $100,000,000 worth of machine tools. Necessarily business conditions determine to a certain extent our purchases, but we are great believers in the elimination from our shops of obsolete types of tools and of those which are worn so that their replacement with new ones will prove worthwhile. Based on the last twenty years of our operation, our yearly purchase of machine equipment has averaged $5,000,000.

We are always open to the introduction of machine tools in our plants which prove, in our opinion, an advantage over what we are using, whether the builder of the equipment be an old source of supply for us or a new one.



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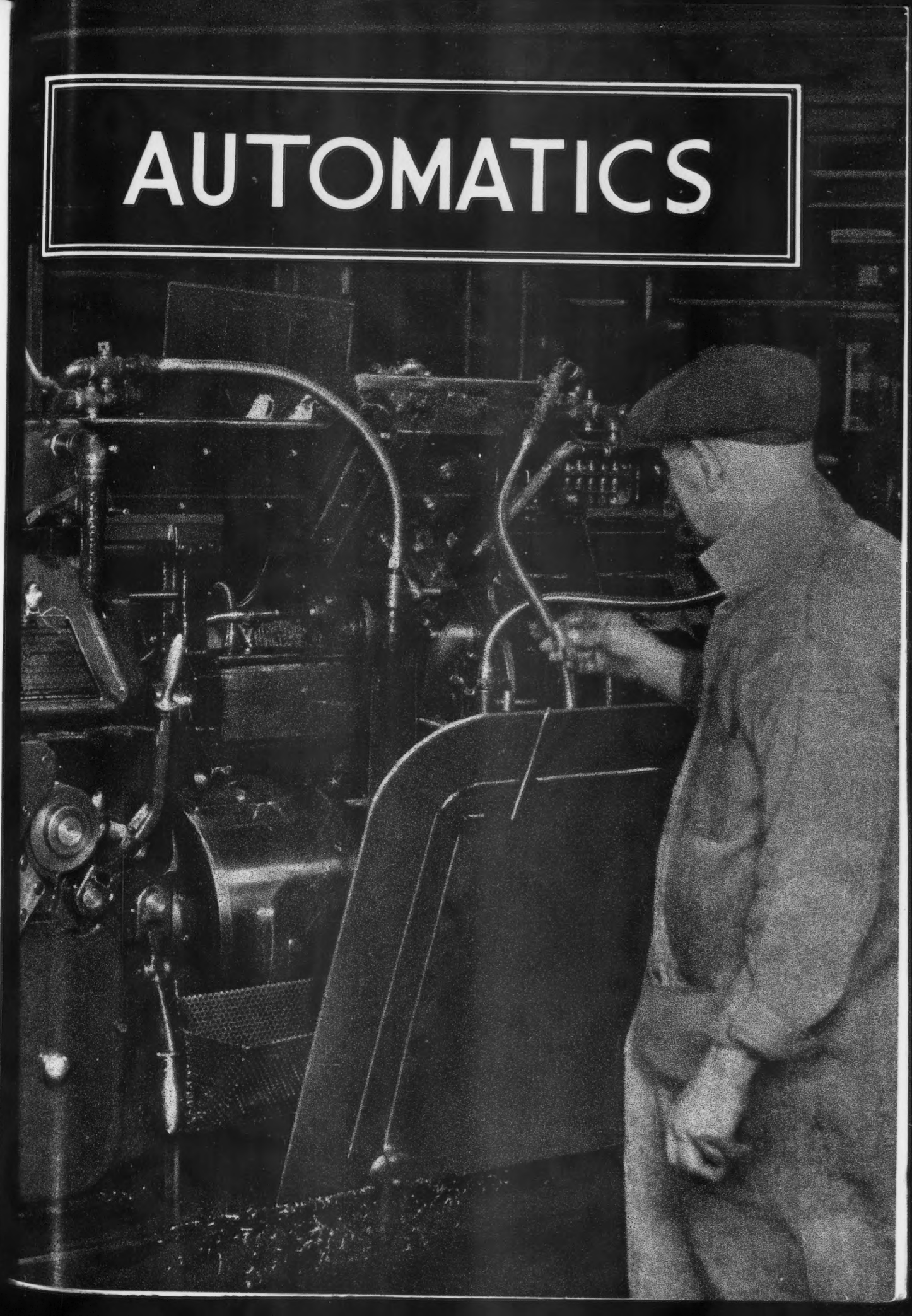
GEOMETRIC No. 12 Threading Machine is a new hand operated machine for general purpose work. In this design, the work is held stationary and the die head advances. (Geometric Tool Co.)

AUTOMATICS

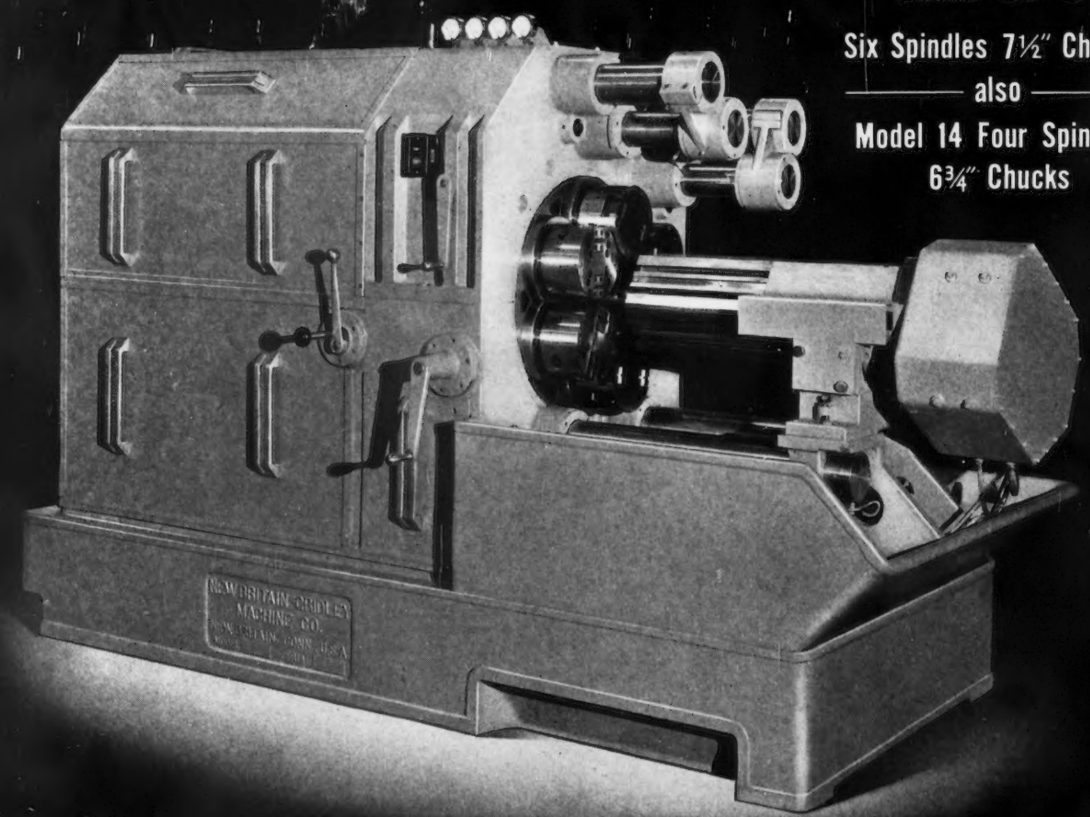


TWO BRAND **NEW** CHUCKERS
BY NEW BRITAIN

See them at the Show!

SPACE Nº 909

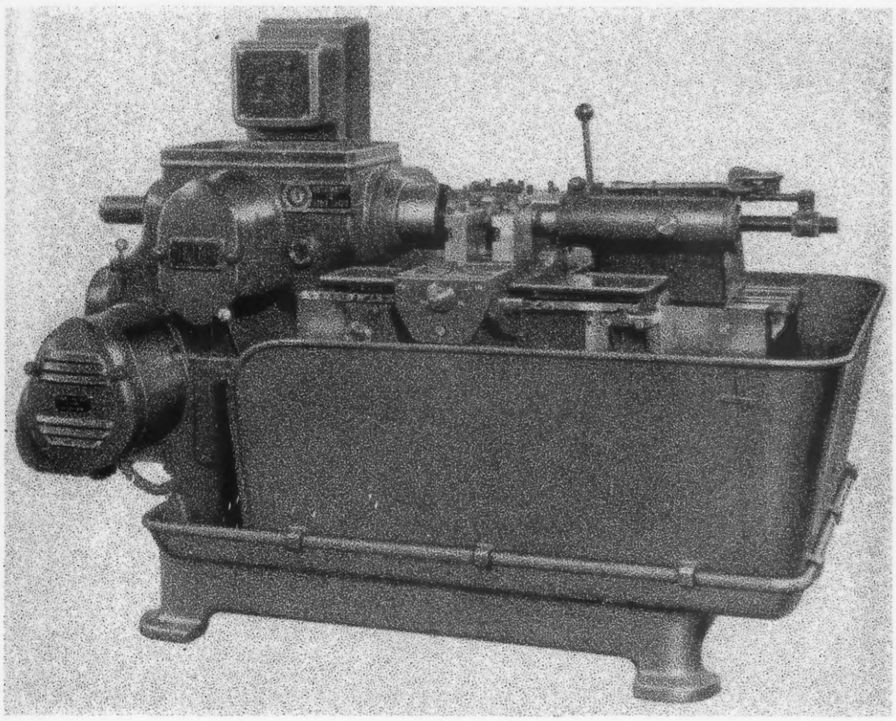
MODEL **675**
Six Spindles 7½" Chucks
also
Model 14 Four Spindles
6¾" Chucks



Also look for our New Line of Automatic Screw Machines
4 and 6 Spindles up to 2¼" capacity

THE NEW BRITAIN-GRIDLEY MACHINE COMPANY

NEW BRITAIN, CONNECTICUT, U.S.A.



AT LEFT

SUNDSTRAND Automatic 10-in. Stub Lathe is a new size having full automatic working cycle controlled by adjustable dogs on an inclosed graduated disk. Made in four models with four groups of spindle speeds ranging from maximum of 400 r.p.m. on Model A to maximum of 1800 r.p.m. on Model D. (Sundstrand Machine Tool Co)

o o o

BELOW

SUNDSTRAND No. 2 Automatic Electromill is a small rigid mill with automatic electric table control for high-speed milling on small parts. Quick change enables small lots to be completed at low cost. (Sundstrand Machine Tool Co.)

o o o

Keeping An Eye On Your Equipment

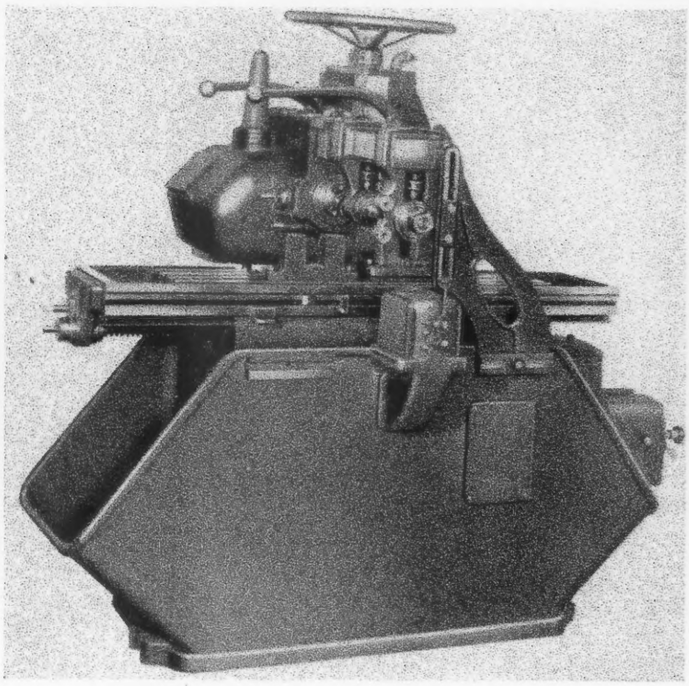
(CONTINUED FROM PAGE 39)

of expenditures for maintenance of machine tools and other shop equipment is dependent in a large measure on the soundness of judgment of divisional superintendents and their assistants.

Card Record for Each Machine

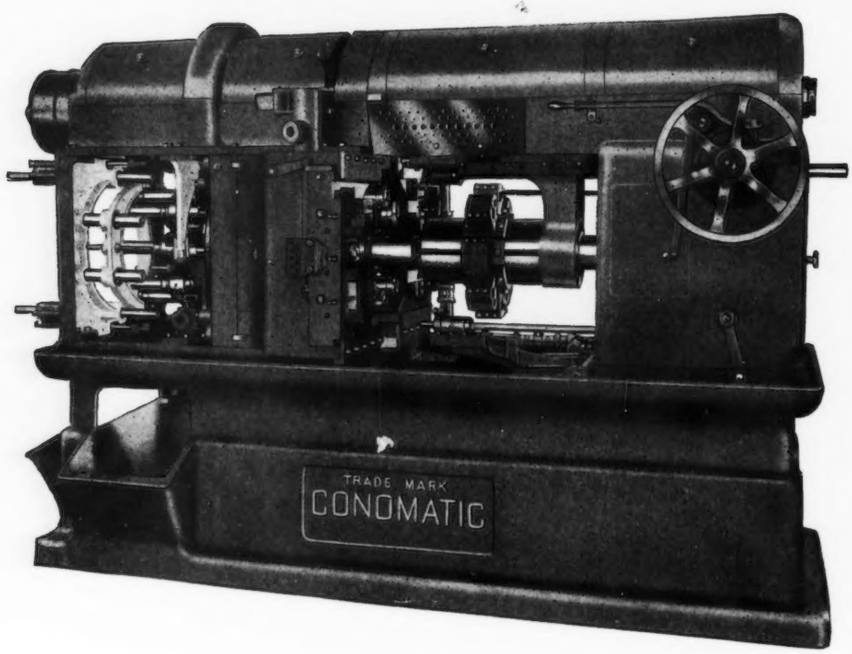
A card record is kept for each machine tool in the department. As breakdowns occur, a notation is made of the date and reason therefor. Nature of repair and amount of expense is entered in its proper place. A periodic review of these card records is frequently helpful in discovering definite limitations in design of certain important parts of a particular make of machine. Such information serves as a very useful guide to the company as replacements are contemplated.

(CONTINUED ON PAGE 160)



THE CONOMATIC D
BOOTHS A & B IN

No trick setups—no bursts of over-speeding—just practical performance on the kind of exacting jobs that are being turned out smoothly and rapidly on CONOMATICS in great production plants the world over.



CONE AUTOMATIC MA
WINDSOR VE

Detroit—Chicago—Philadelphia—San Francisco Clevel

In England it's the Churc

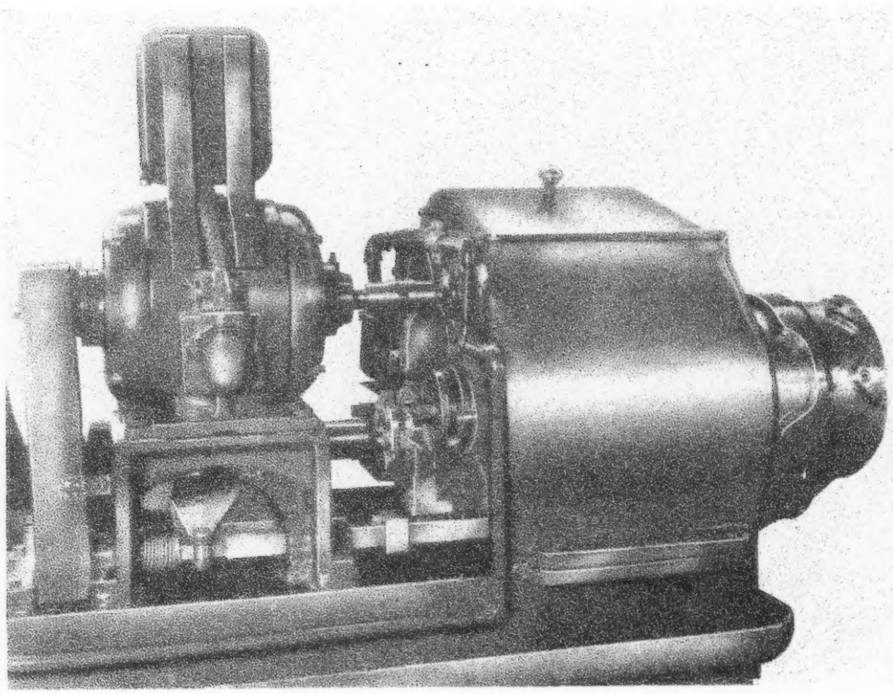
DEMONSTRATION
IN THE ARCADE

In addition to the latest CONOMATIC Eight and the 2⅝" CONOMATIC Four Spindle Automatics, we will exhibit at Cleveland a new type of CONOMATIC with features of particular interest to screw product manufacturers.

MACHINE CO., INC.
VERMONT

Cleveland—Pittsburgh—Indianapolis—Syracuse

Churchill-Conomatic



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AND BELOW

NATIONAL Acme New Modern Single Spindle Automatic Screw Machine is a simplified design for operations requiring forming, drilling and cut-off. Changes in set-up can be quickly made, there is practically no idle time and all wearing parts run in oil. (National Acme Co.)

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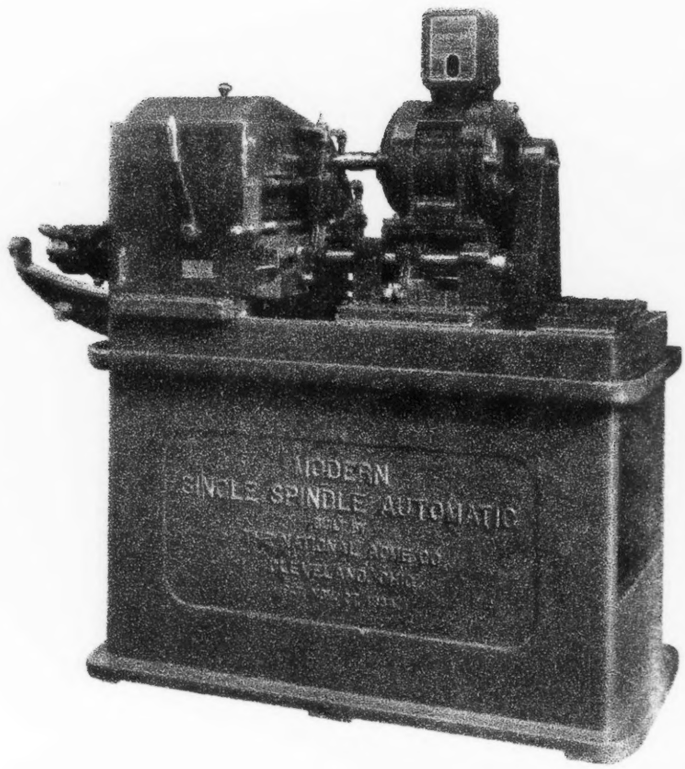
(CONTINUED FROM PAGE 157)

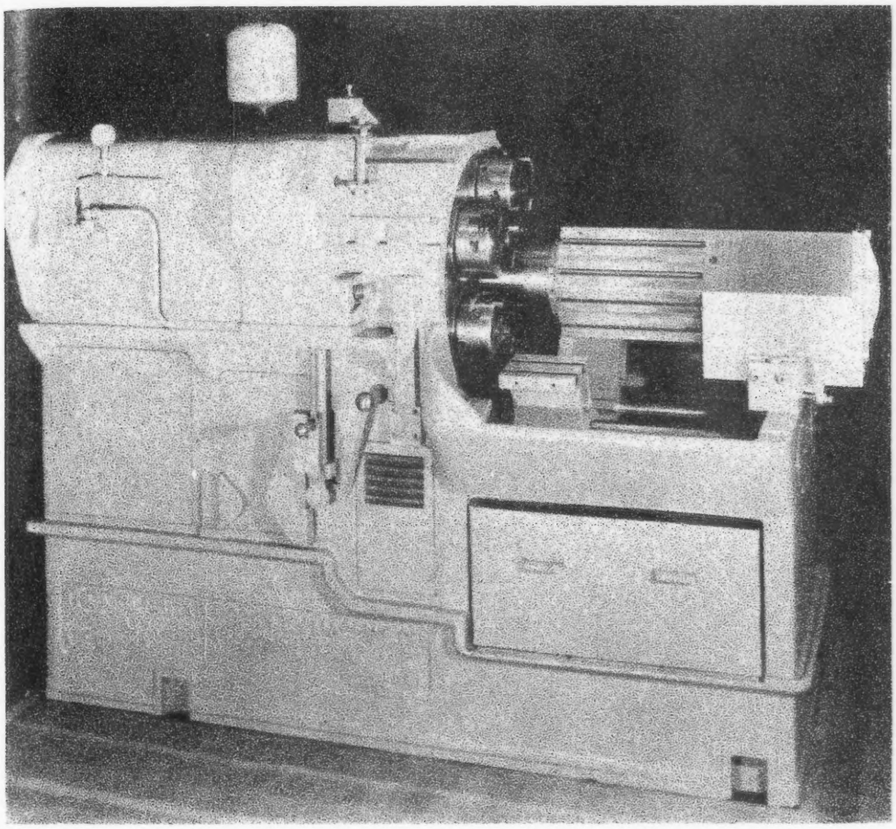
Lubrication is a very important factor in operating machine tools. Our laboratories have compiled a series of purchase specifications as a result of exhaustive tests of the merits of various lubricants. Instruction sheets are issued to manufacturing departments which indicate the proper type of lubricant for each specific requirement. In spite of this apparently thorough control, a great portion of our total expenditures for machine tool repairs has been caused by either improper or insufficient lubrication.

Automatic Oiling Reduces Expense

While the percentage of repairs due to lubrication limitations have somewhat decreased in relation to repairs for all reasons, actual expenditures have been substantially reduced in the last several years through the incorporation of an individual automatic lubricating system for each new machine tool. These devices have found almost universal favor probably for reasons similar to ours—avoidance of the all too frequent interruptions

(CONTINUED ON PAGE 162)





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WHEN stock in any spindle is too short to permit machining a complete piece of work, this new automatic screw machine stops itself, a red light flashing to notify the operator. On stopping, all tools are withdrawn and the collet opens. Spindle carrier is cam-lifted completely from its bearing during indexing to eliminate wear. Slides mounted on hardened cylindrical studs are entirely protected from chips and grit. (New Britain-Gridley Machine Co.)

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AT RIGHT

THE spindle carrier of this No. 16 multiple-spindle chucking machine does not touch machine frame or housing during indexing. Wear on spindle carrier or on its supporting surfaces is eliminated, thus maintaining tool and spindle alinement. Indexing is accomplished in 1½ sec. (New Britain-Gridley Machine Co.)

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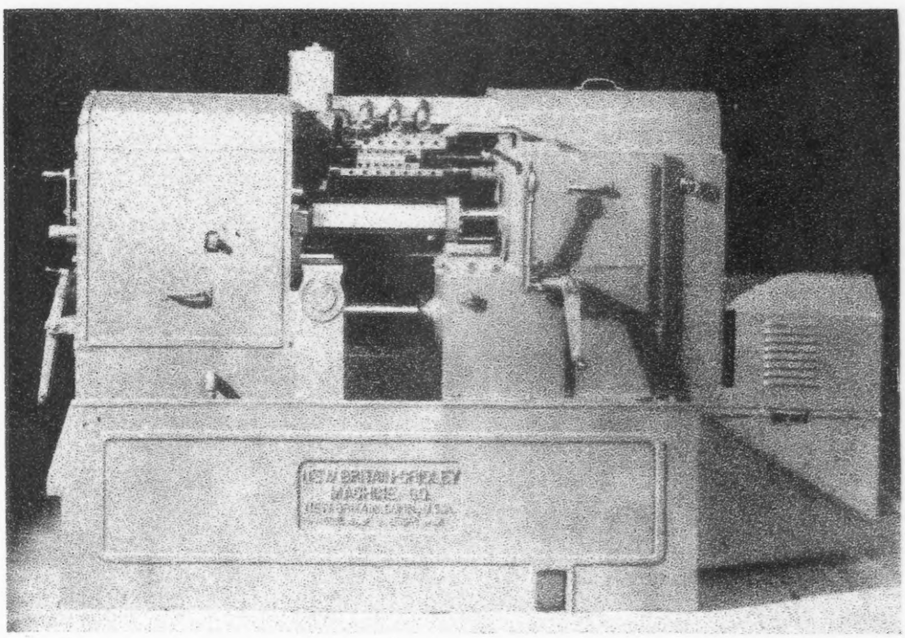

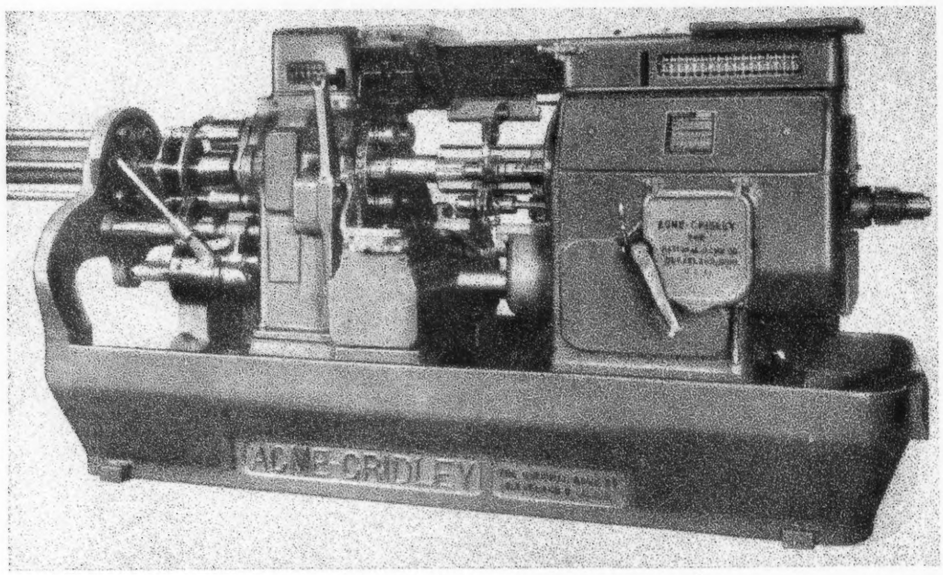

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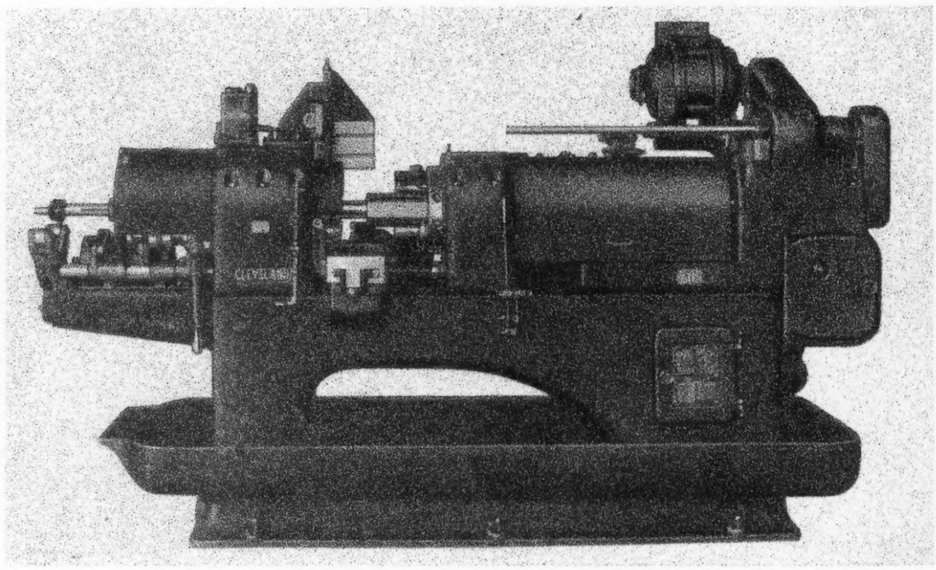
FLEXIBILITY features this six-spindle automatic, built-in 9/16 to 1⅝-in. capacity. Spindles at top and bottom are in line for direct application of tooling from the four heavy independently-operated cross-slides. The two spindles at the sides are accessible for a "short coupled" double deck toolholder or independent cross-slide if required. (National Acme Co.)

o o o

FRAME, bed, and supports for all spindle and tool-turret bearings are cast integral in this improved multi-spindle screw machine. Arch-type frame construction provides liberal chip room and chip disposal. (Cleveland Automatic Machine Co.)



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(CONTINUED FROM PAGE 160)

which were due mainly to the faster operating speeds made possible through improved cutting tools. While such devices provide generally adequate protection, there are thousands of machine tools being operated in the United States today which are entirely dependent on human attention for lubrication, and several additional years will be required to complete the evolution of a 100 per cent changeover to automatic systems of one type or another. Thorough and effective supervision of lubrication of manufacturing machinery is a very important duty of a department head in keeping maintenance costs at a minimum.

Many of our machine repairs might be classed as of minor importance from the standpoint of expense involved in each individual case. Collectively, however, they represent a very substantial item. Occasionally, a major breakdown occurs, in which case all factors involved must be given thorough consideration before a decision can be reached as to whether repairs should be undertaken or a new machine purchased.

Sound mechanical and business judgment are essential in controlling maintenance expenditures. A man responsible for this activity may very well be likened to the

(CONTINUED ON PAGE 164)

GOSS & DeLEEUW

PRESENTS *at the* CLEVELAND SHOW

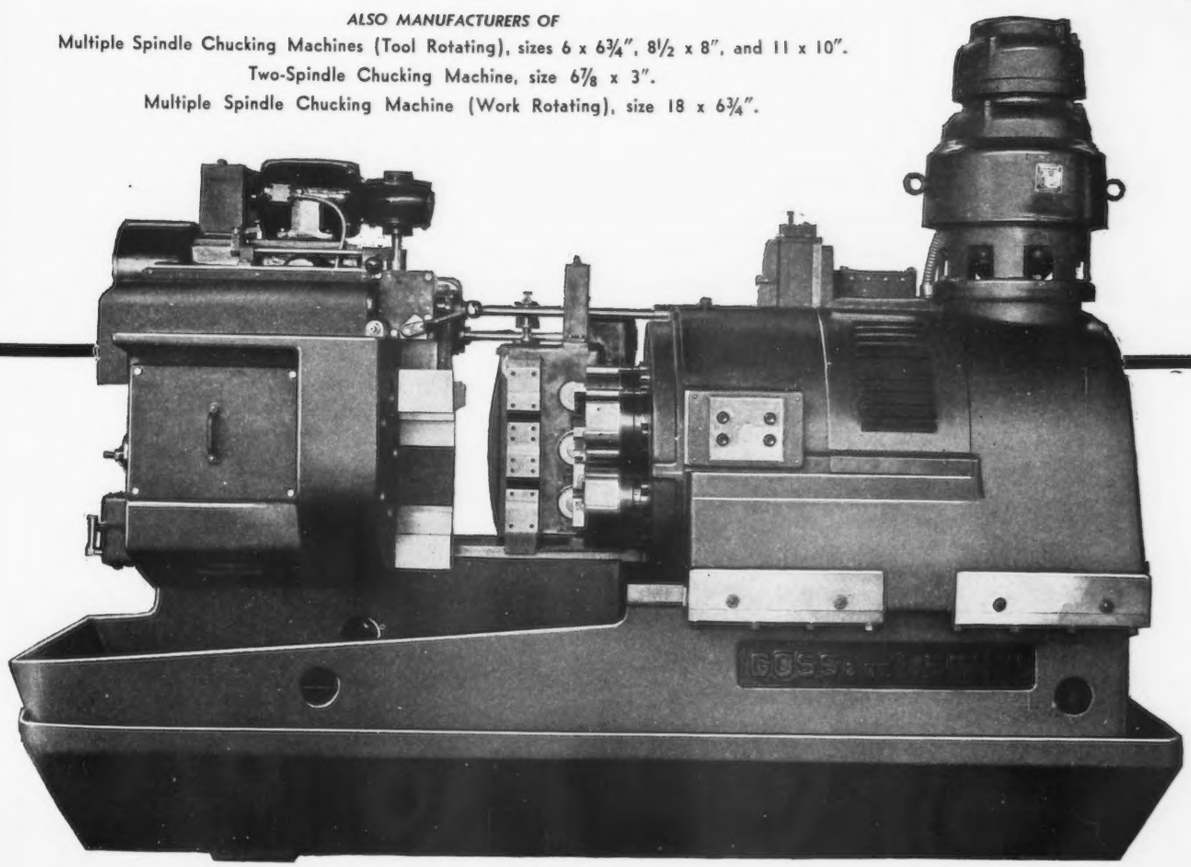
NEW WORK— ROTATING CHUCKING MACHINE

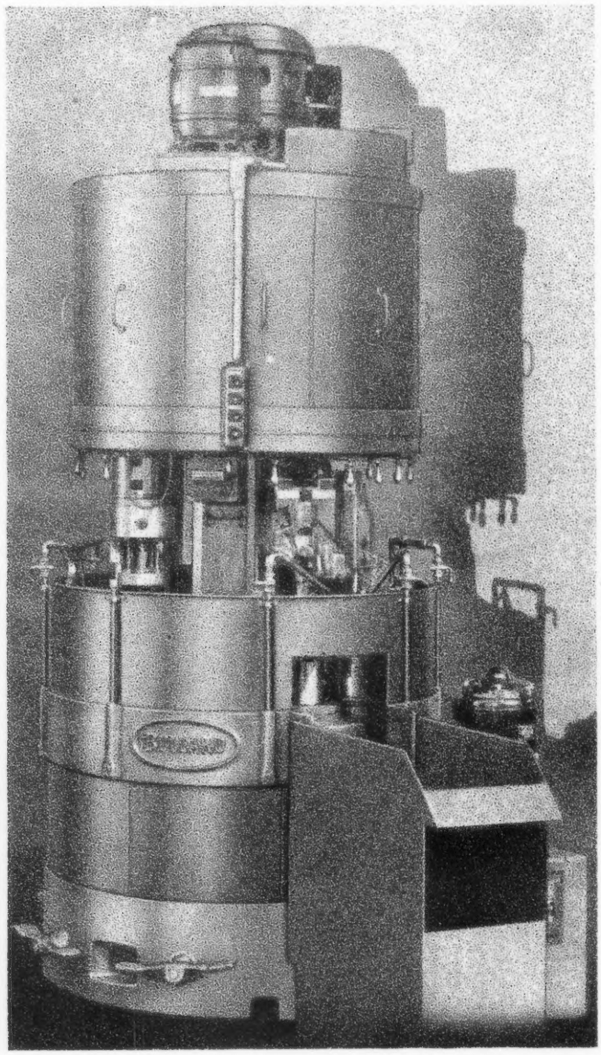
A machine of durable and rigid construction for maximum production with accuracy. Easy to set up, with adequate tool space, a large amount of chip room, with abundant coolant; built in direct connected motors; a wide range of spindle speeds; a new spindle clutch construction; new cross slide construction, built in electrical control, with electrically operated chucks.

BOOTH 1008 CLEVELAND SEPT. 11-21

The GOSS & DeLEEUW MACHINE COMPANY
NEW BRITAIN **CONNECTICUT**

ALSO MANUFACTURERS OF
Multiple Spindle Chucking Machines (Tool Rotating), sizes 6 x 6¾", 8½ x 8", and 11 x 10".
Two-Spindle Chucking Machine, size 6⅞ x 3".
Multiple Spindle Chucking Machine (Work Rotating), size 18 x 6¾".





ADVANTAGES of the Mult-Au-Matic method of machining is extended to small work by development of this high-speed, eight-spindle, J-series machine, built in 8 and 12-in. capacities, respectively. Electric control includes three push-button stations, each of which has four separate buttons, one for emergency control, one for starting the main motor, one for controlling the head traverse advance, and another for head traverse return. Speed and feed changes number 41 each. (Bullard Co.)

(CONTINUED FROM PAGE 162)

family physician—only ministering to the ills of machinery rather than humans. Cause and cure are his objectives, and his effectiveness is directly measurable in the dollars he spends to maintain his plant in adequate operating condition.

Maintenance of manufacturing equipment is a variable expense item of considerable magnitude and must be adequately controlled by management if maximum return on invested capital is to be expected.

The confidence of the operator in his machine is a very important factor influencing return on the investment. If a machine is, for any reason, unsafe to operate, a portion of the operator's efforts will be absorbed in avoiding hazards—resulting in less productive utilization of the machine.

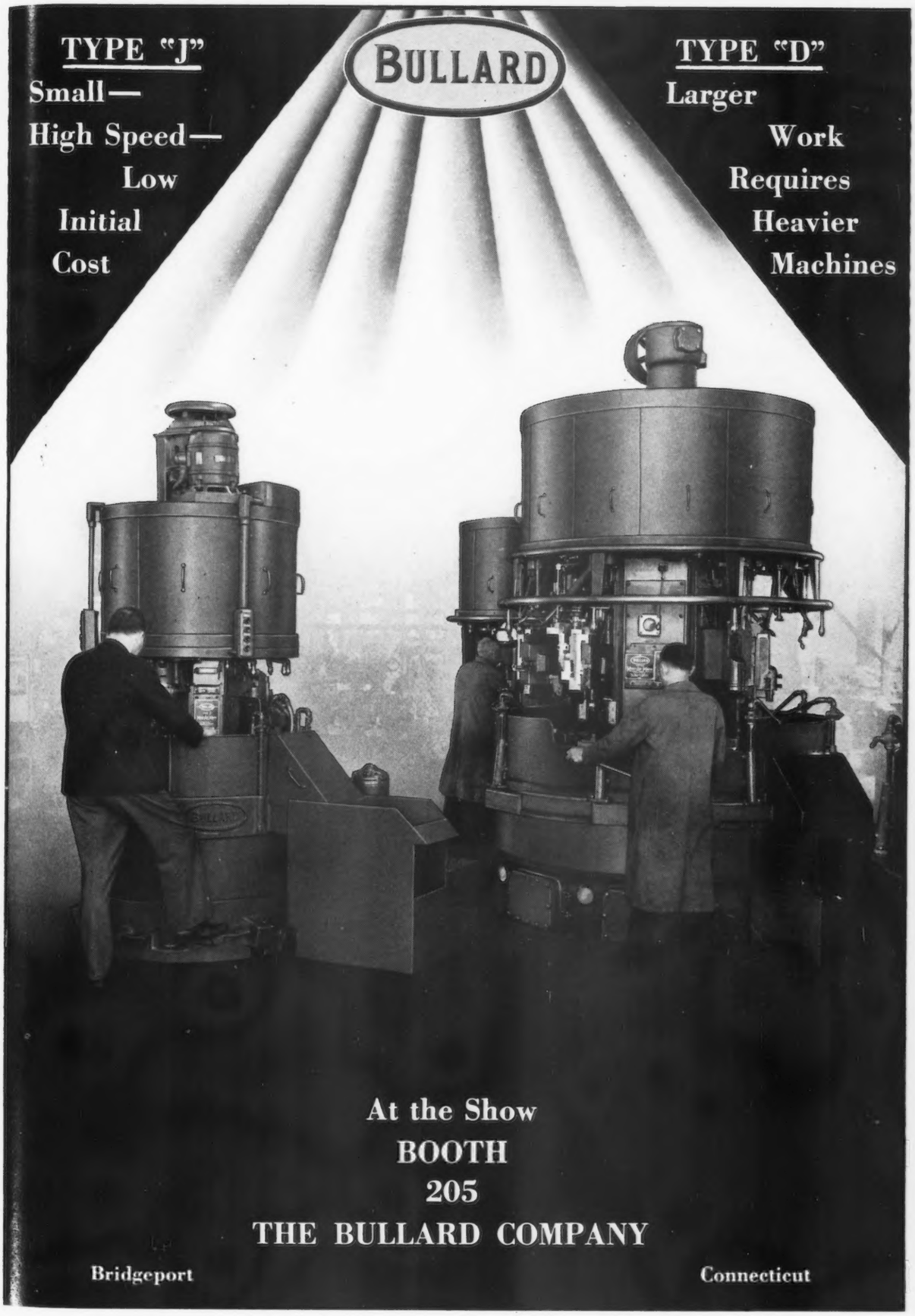
The General Electric Co. spends thousands of dollars each year in protecting its employees against accidents. This activity was started on an organized basis nearly 25 years ago. Each plant has a well qualified individual directly in charge of safety work and he is assisted by general and divisional committees comprised, for the most part, of supervisors and employees of the department.

Twenty-five or so years ago, little constructive thought was devoted to the subject and employees were given no adequate protection against accidents in the performance of their daily tasks. Elaborating this point, over half a million dollars was spent over a ten-year period starting in 1912 in providing protection of a single common character—guarding of hazardous parts of manufacturing equipment. Fortunately, for humanity's sake, much advanced and constructive thought has been devoted to this subject. Designers of machine tools and other types of shop equipment have become "safety conscious." We as operators of such equipment feel obliged to contribute our full share of time and energy to the problem—with the result that accidents to operators of our manufacturing machinery have been reduced to a minimum.

One very gratifying result of our safety activities has been the almost total elimination of eye accidents. It is often difficult to convince an employee of the necessity of wearing goggles in doing jobs which present hazard to the eyes. This is more often the case where no accident has previously occurred on work of a similar character. Our investment in goggles for the year 1934 alone amounted to more than $9,000.00. There can be no question raised regarding the wisdom of this expenditure when reference is made to the accompanying illustration showing how one worker's eyes were saved.

Every resource at our command is devoted to making our manufacturing plants a safe place for our employees to work. The graph herewith shows, over a period of years, the effectiveness of our safety activities.

(CONTINUED ON PAGE 166)


TYPE "J"
Small—
High Speed—
Low
Initial
Cost
BULLARD
TYPE "D"
Larger
Work
Requires
Heavier
Machines
At the Show
BOOTH
205
THE BULLARD COMPANY
Bridgeport
Connecticut

(CONTINUED FROM PAGE 164)

The General Electric Co. is very proud of its safety record.

A clean and orderly factory is conducive to greater efficiency and safety on the part of employees. Containers, tote boxes, stockroom boxes, etc., should be stacked evenly and symmetrically in relation to aisles or walls. Chairs and stools temporarily not in use should be properly arranged. Materials kept on benches should be neatly piled and all tools should be in their proper places. Cabinet tops should not be used for storing miscellaneous odds and ends.

Floors and benches should be kept free of dirt and debris. Drinking fountains should be thoroughly cleaned daily and wash and rest rooms should be maintained in a highly sanitary condition. Ample supply of soap and of paper handtowels should be furnished in rest rooms for the comfort and convenience of employees.

Odds and ends of materials, miscellaneous parts, tools, etc., should not be scattered over a factory floor. After a job is finished all tools, material, gages, etc., should be removed from a machine, after which the machine should be wiped clean of chips, oil, cutting lubricant, etc.

Aisles should be kept free of obstructions such as carelessly parked hand and platform trucks, careless delivery of raw materials, etc. Machinery should be so arranged that bars of stock being machined do not extend into the aisle area. Safety rules and regulations should be faithfully observed, thus reducing to a minimum the hazard of fire or injury to an employee.

Additional expenditures are not at all necessary in maintaining housekeeping standards at a high level. The chief essential is positive insistence on the part of the department head that each employee under his supervision do his fair share in keeping his workroom clean and orderly.

Factory Lighting

Weather reports for the past 30 years in a large representative industrial city in this country indicate that during a large portion of the time there is insufficient daylight for purposes of "seeing." The average day consists of six hours of sunshine, six hours of cloudiness and 12 hours of darkness. This, of course, varies with the seasons of the year; for example, in July, nine hours of sunshine, six hours of cloudiness and nine hours of darkness. In December, however, the average day comprises two hours of sunshine, seven hours of cloudiness and 15 hours of darkness. Interpreting these statistics in terms of light intensity within a factory, the obvious conclusion is reached that adequate artificial illumination must be provided for those times when light from natural sources is insufficient. Natural light decreases very rapidly as the distance from a window increases. On a bright day employees working close to windows may have the benefit of 150 foot-candles of light intensity, while the employee 20 ft. from the windows may have but 5 foot-candles—an amount which is insufficient for the majority of tasks.

Although good lighting is to some extent a humanitarian measure, very definite material benefits also result, such as reduction of accidents and of spoilage losses. It also improves supervision and the morale of employees, and makes possible efficient and safe night operation.

While definite statistics are not available regarding the effect of good lighting on frequency of accidents in industrial concerns, we are led to believe that a workman's ability to "see" properly at all times has had a very definite effect on the number of casualties. Undoubtedly, in many cases the cost of adequate lighting is far less than the accident cost which it eliminates.

Greater Accuracy With Good Lighting

As light intensity is increased, vision becomes much keener and details may be observed more rapidly, indicating that more accurate work will characterize the well-lighted factory. A definite material value which might be obtained in support of this statement is clearly demonstrated in the operation of one of our statistical department's tabulating machine sections. Production of female operators was increased approximately 30 per cent by supplementing the general lighting of 15 foot-candles intensity with illumination of the order of 50 foot-candles. In addition to this the errors were decreased to about one-half of their previous frequency. The additional illumination was obtained through the use of units similar to the study and reading lamps recommended by the Illumination Engineering Society.

Adequate illumination in a factory enables a foreman to observe more closely the actions of his operators and the performance of his machines. He can thus more quickly detect faulty operation and note conditions which might be conducive to an accident or spoiled work. An employee would much prefer to work in a well-lighted plant rather than in a dark, gloomy one. Good illumination offers a satisfactory and economic way to advertise the desirability of a factory as a place in which to work and, affording as it does better working conditions, the labor turnover might be expected to be low.

Recognized standards of required light intensity have been developed for different occupations. These vary from 10 foot-candles for rough machine and bench work to 100 foot-candles for bench, machine and inspection work of a high degree of precision. Illumination of as much as 30 foot-candles can be entirely supplied, in most cases, from the general lighting system.

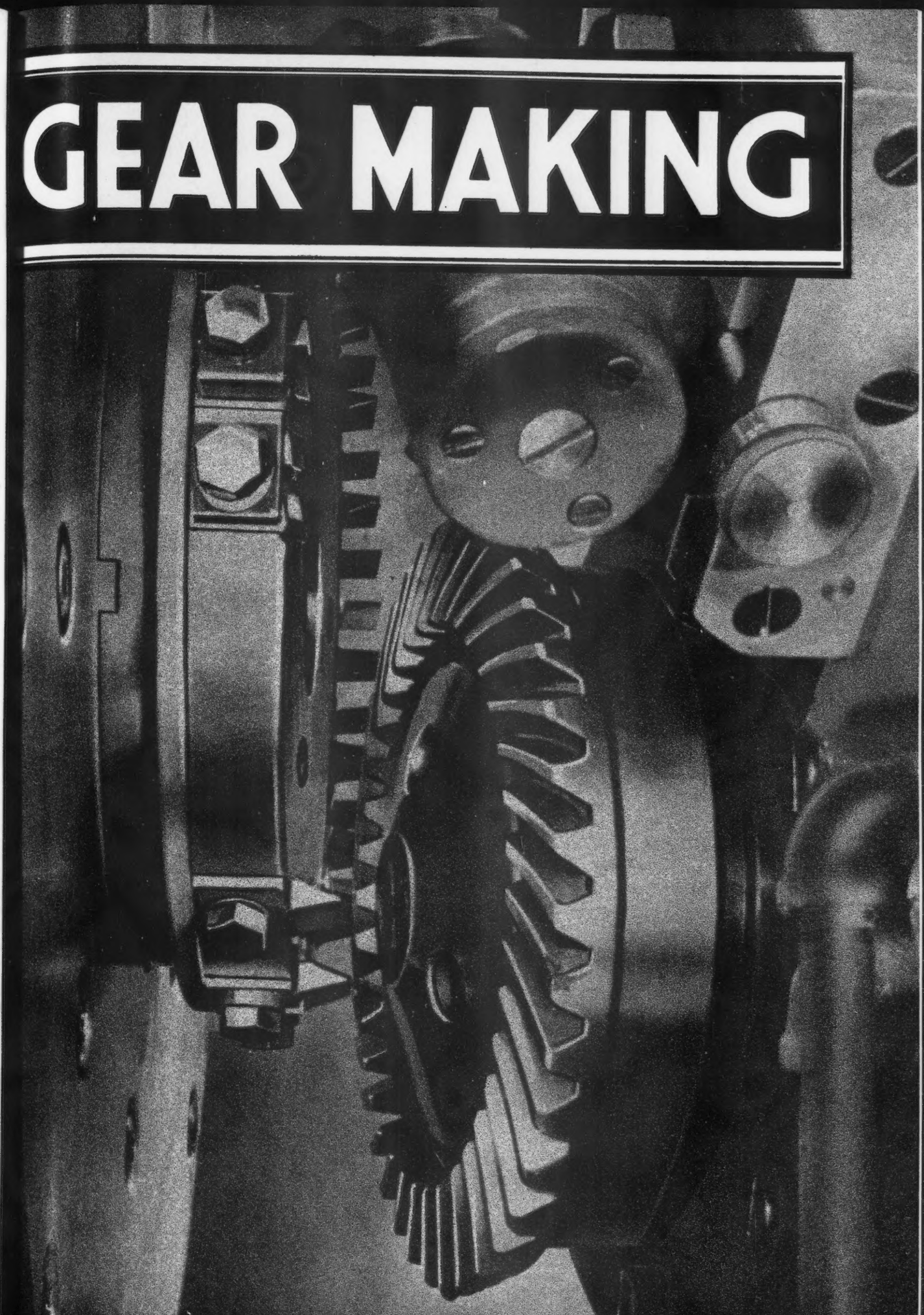
Spotlights Supplement General Lighting

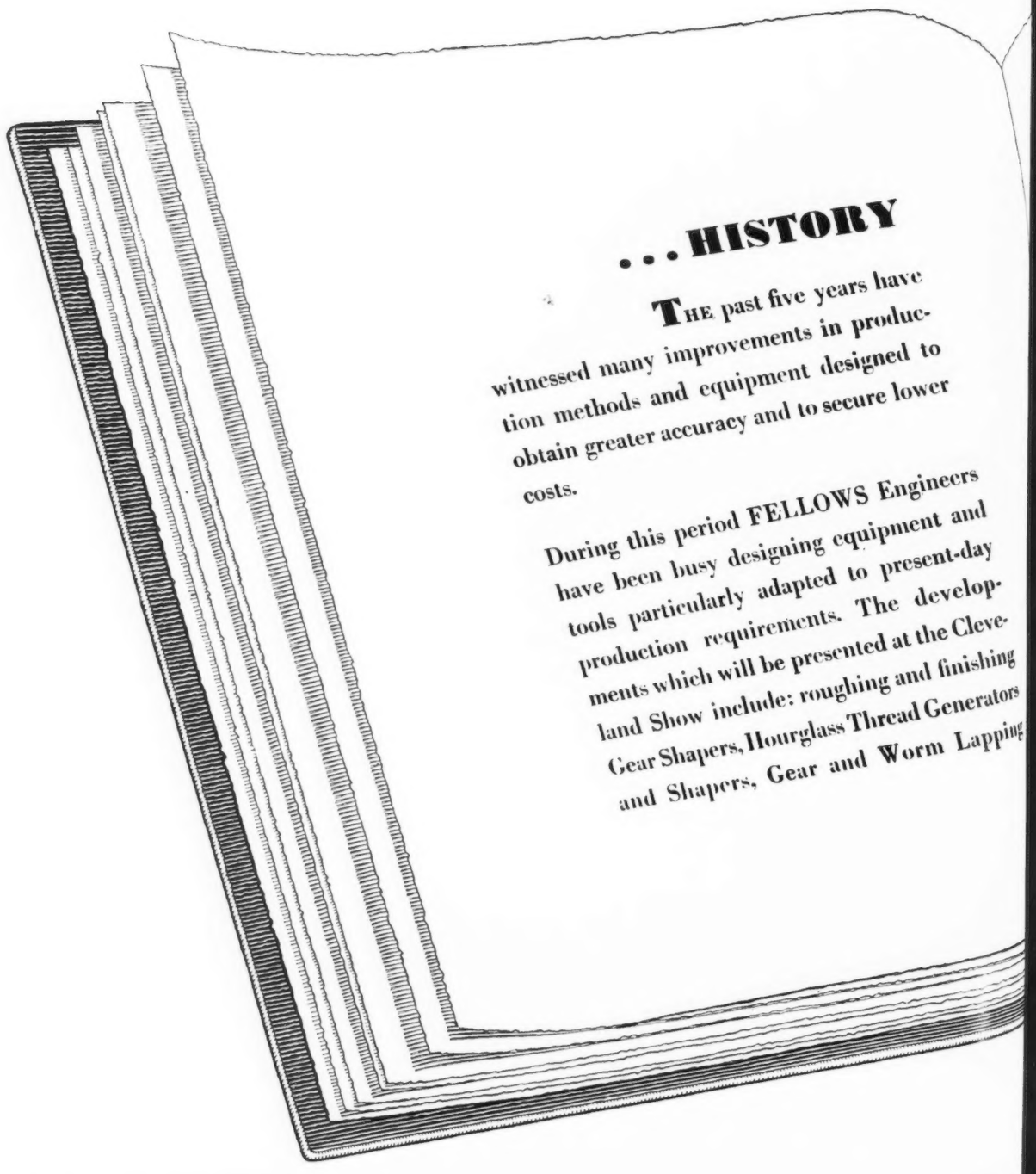
In the operation of manufacturing plants there are usually certain segregated areas where especially high levels of illumination are necessary. Increased illumination to satisfy such conditions can usually be obtained most economically by supplementing the general lighting with spot type units. By placing lowered spotlights near the ceiling and directing the light on the work, illumination can be increased where it may be most helpful. We have also several installations in our plants of the new high-intensity mercury-vapor lamps. These, when used in conjunction with incandescent lamps, provide a very satisfactory "daylight" color of high-intensity illumination for certain specific requirements.

A factory lighting system which is properly designed, is of adequate capacity, and is constructed with good equipment will provide satisfactory illumination if given proper care. Tests made in several of our plants indicate that the effectiveness of a truly adequate system may be depreciated by as much as 50 per cent unless lighting equipment — diffusers, reflectors and lamps—is given a thorough cleansing periodically. Just how often this is done in our plants depends

(CONTINUED ON PAGE 176)

GEAR MAKING

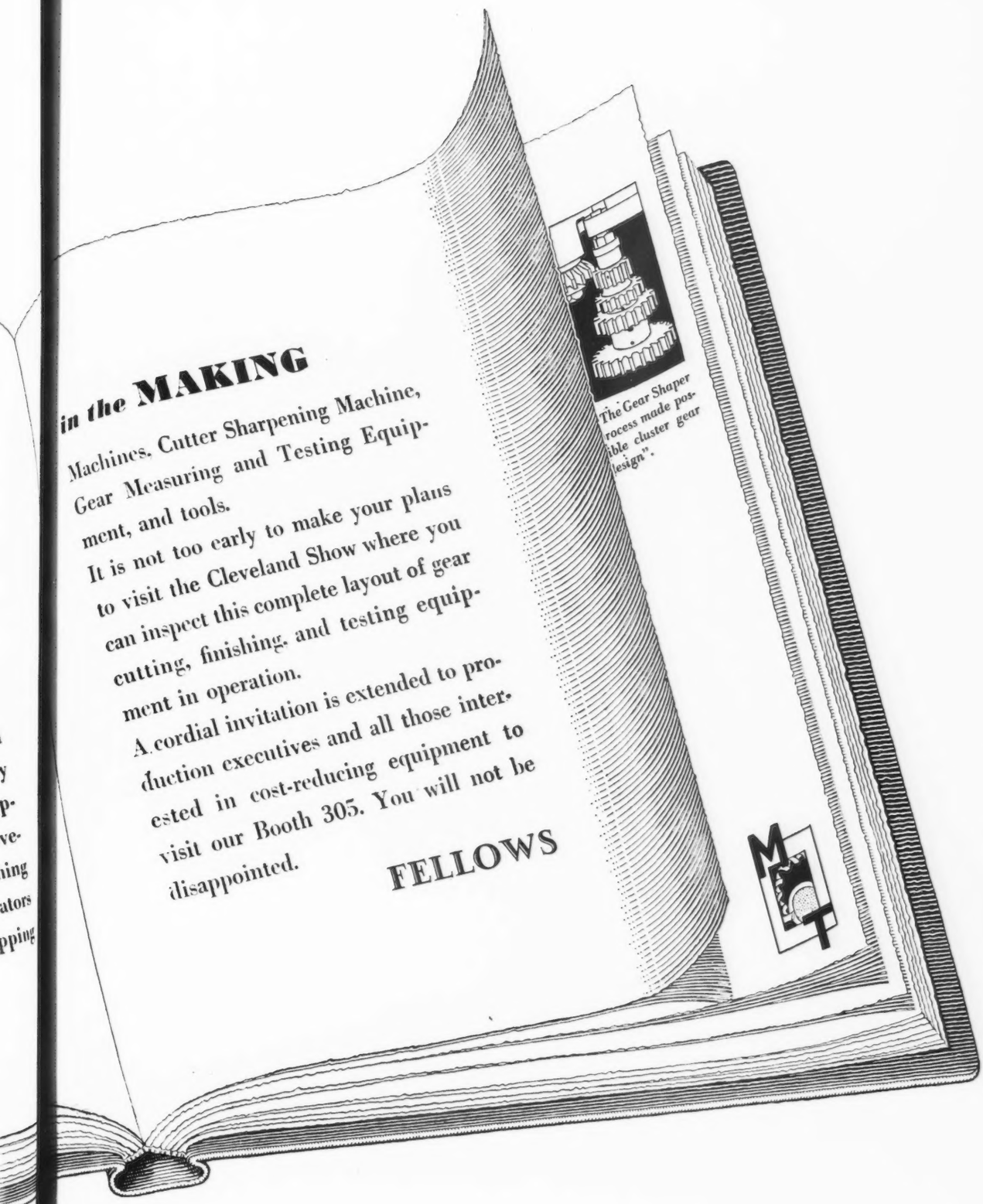




. . . HISTORY

THE past five years have witnessed many improvements in production methods and equipment designed to obtain greater accuracy and to secure lower costs.

During this period FELLOWS Engineers have been busy designing equipment and tools particularly adapted to present-day production requirements. The developments which will be presented at the Cleveland Show include: roughing and finishing Gear Shapers, Hourglass Thread Generators and Shapers, Gear and Worm Lapping


in the MAKING
Machines, Cutter Sharpening Machine,
Gear Measuring and Testing Equip-
ment, and tools.
It is not too early to make your plans
to visit the Cleveland Show where you
can inspect this complete layout of gear
cutting, finishing, and testing equip-
ment in operation.
A cordial invitation is extended to pro-
duction executives and all those inter-
ested in cost-reducing equipment to
visit our Booth 305. You will not be
disappointed.
FELLOWS
The Gear Shaper
rocess made pos-
ible cluster gear
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M
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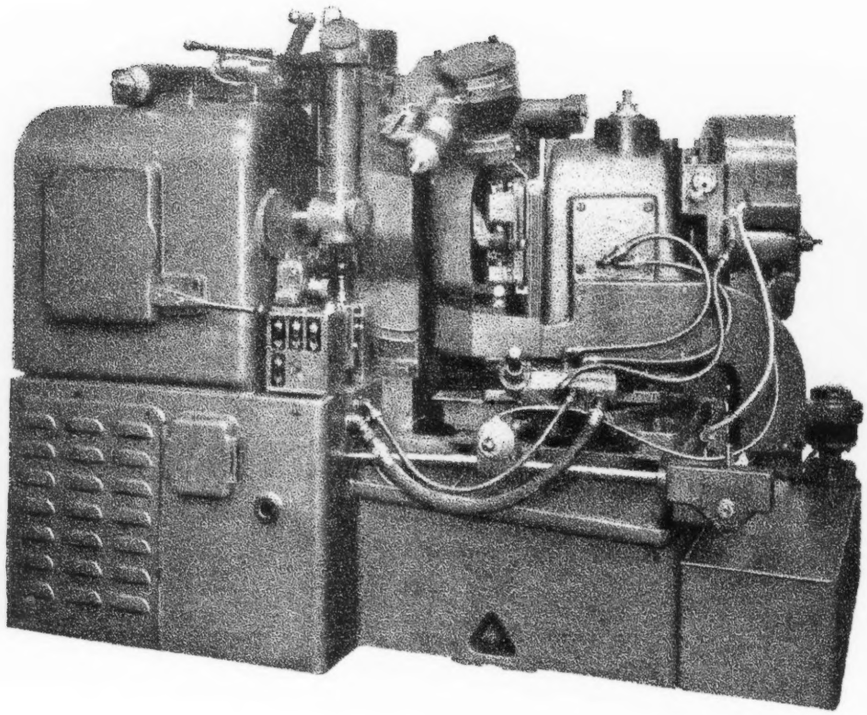

o o o

AT LEFT

GLEASON No. 14 Spiral Bevel and Hypoid Gear Grinder is a new machine for grinding the teeth of automotive ring gears and pinions with increased speed and accuracy. (Gleason Works.)

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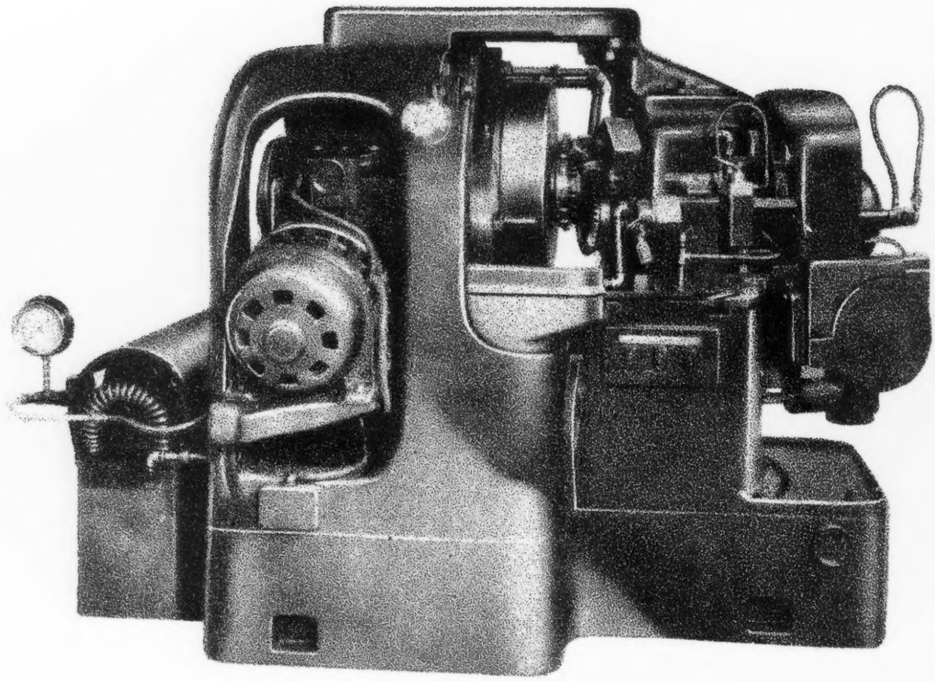
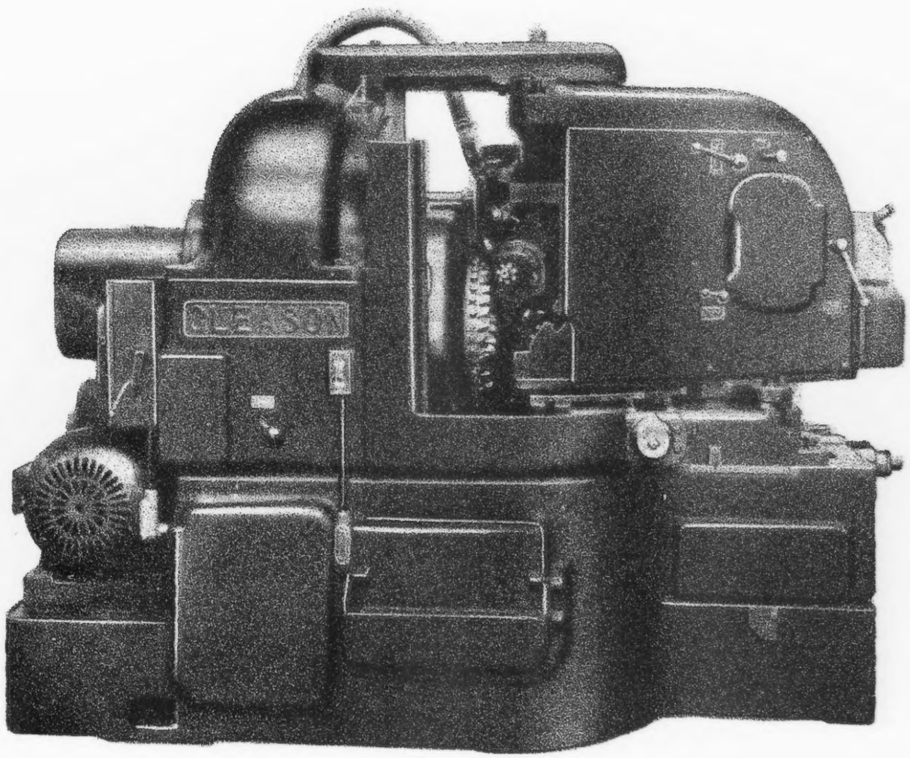
o o o

AT RIGHT

GLEASON No. 11 Single Cycle Spiral Bevel and Hypoid Gear Finishing Machine employs a new method said to be the fastest yet for finish cutting automotive ring gears. Uses inserted blade face mill type cutters with two series of blades whereby a series of light cuts is followed by full depth profiling. (Gleason Works.)

o o o





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AT LEFT

GLEASON No. 13 Spiral Bevel Pinion Rougher is a new design which replaces the former 15-in. Pinion Rougher and which has two to three times its output. Hydraulic movement control and brake. (Gleason Works.)

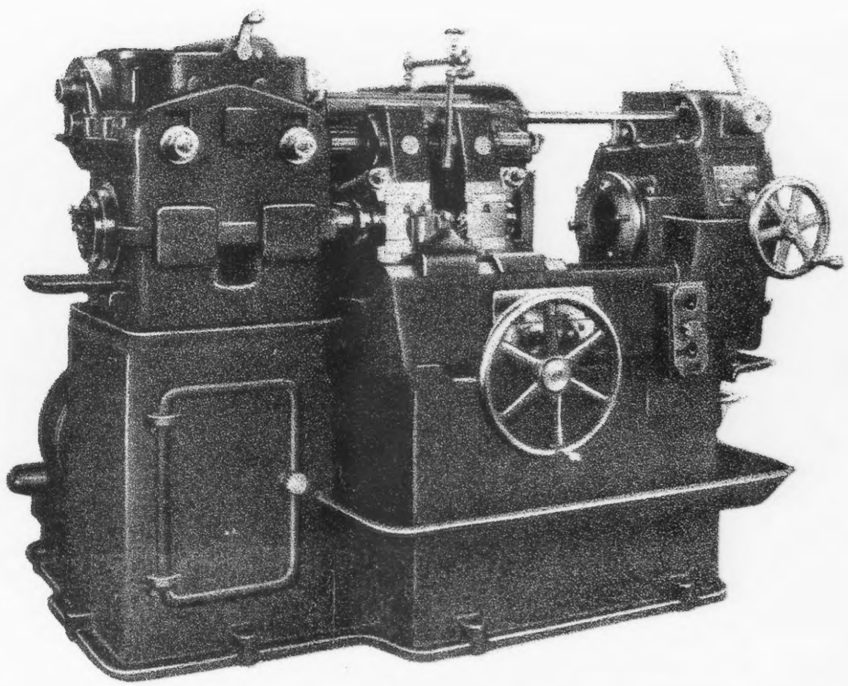
o o o

o o o

AT RIGHT

FARREL-Sykes Gear Generating Machine has new features which permit higher operating speeds and increased accuracy together with very quiet operation. Permits new machining operations not associated with gear cutting. Automatic except for setting up and loading. (Farrel-Birmingham Co.)

o o o



These 15 MACHINES will perform at Cleveland

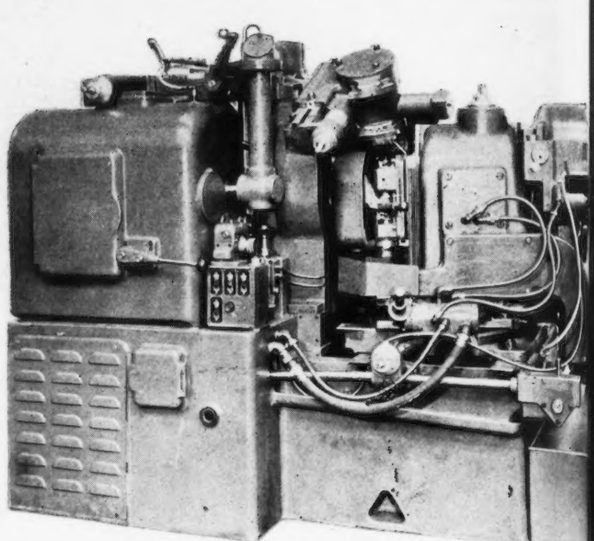
The motor car is the symbol of modern mechanization—the result of precision mass production. The means by which automotive manufacturers achieve these brilliant results will be on exhibition at the National Machine Tool Exposition in Cleveland, September 11 to 21.

In the Gleason booth (No. 811) you will see these 15 machines in production covering every phase of bevel gear production including roughing, finishing, spiral bevel grinding, lapping and testing. These are the means by which precision is put to work silencing automotive differentials and making them more efficient.

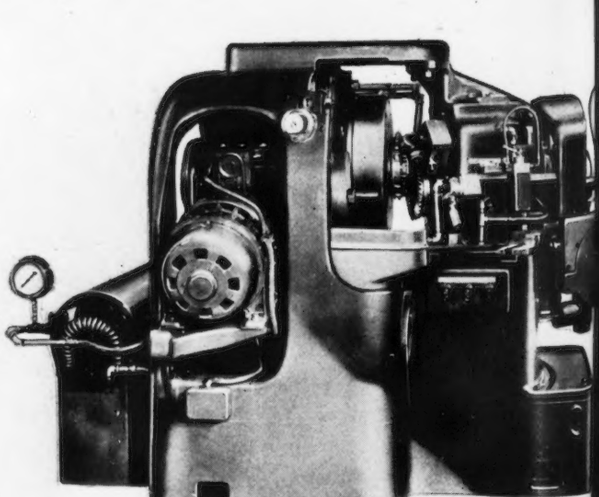
See these 15 *modern* machines at the Show.

GLEASON WORKS
1000 UNIVERSITY AVENUE
ROCHESTER, N. Y., U. S. A.

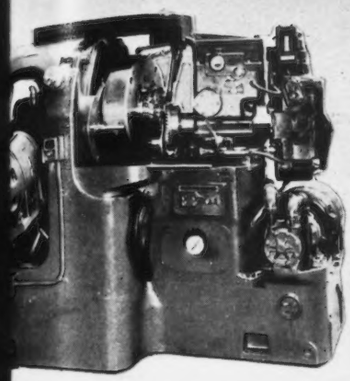
No. 15 Spiral Bevel and Hypoid Pinion Rougher



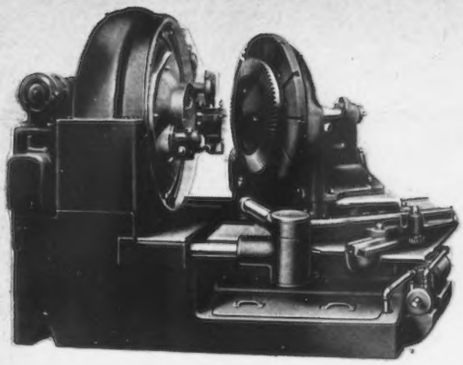
No. 14 Spiral Bevel and Hypoid Gear Grinder



No. 11 Single Cycle Spiral Bevel and Hypoid Gear Finishing Ma

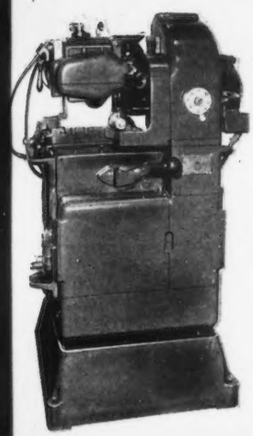


Spiral Bevel and Hypoid Gear Rougher

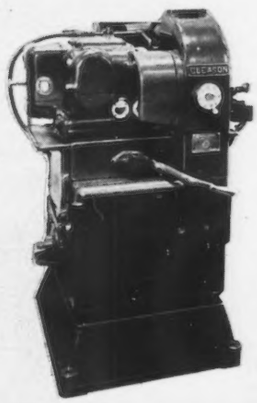


No. 40 Spiral Bevel Gear Planing Generator

3" Testing Machine



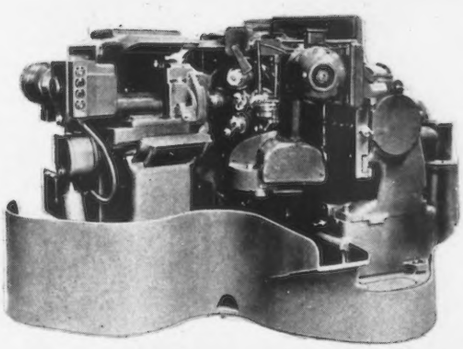
3" Spiral Bevel Gear Generator



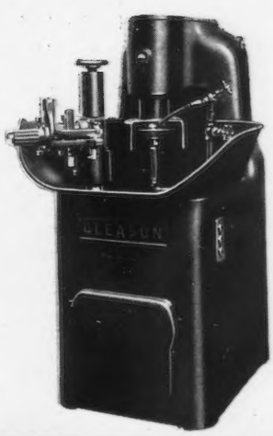
3 Straight Bevel Gear Generator

No. 13 Universal Gear Testing Machine

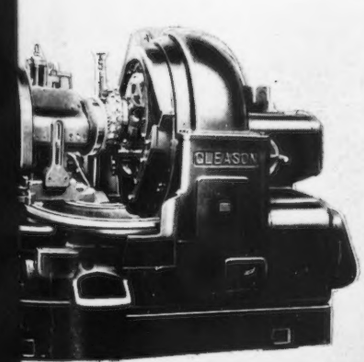
Spiral Bevel and Hypoid Gear Generator



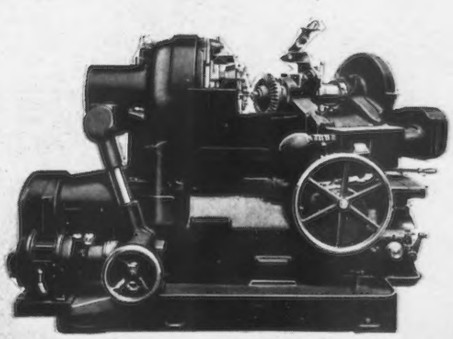
No. 9 Completing Generator for the rough and finish cutting of differential gears and pinions . . . in one handling!



No. 7 Spiral Cutter Sharpener

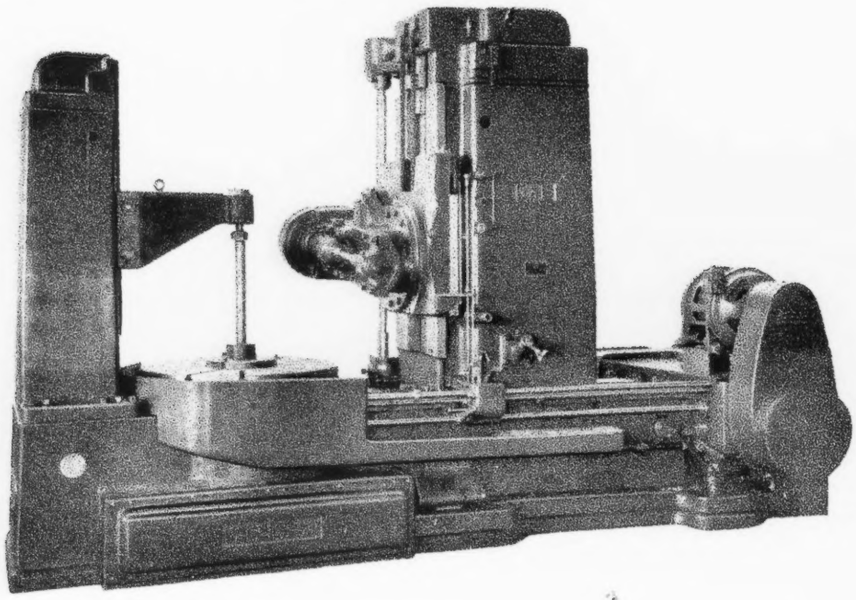


Spiral Bevel and Hypoid Gear Generator



12 Straight Bevel Gear Generator

No. 12 Generator Tool Sharpener



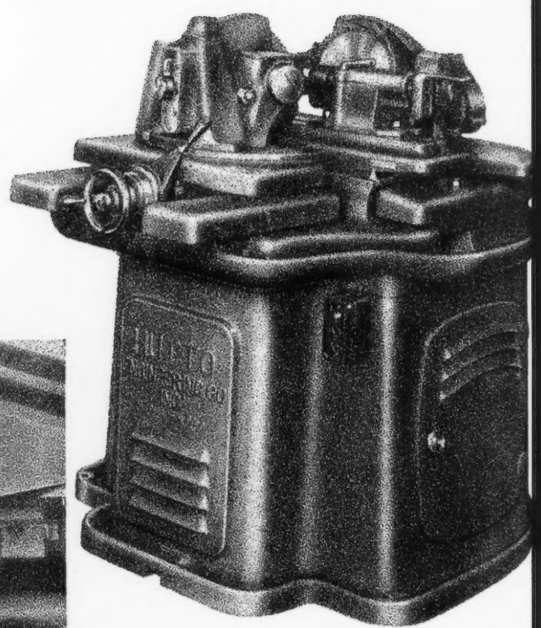
o o o

AT LEFT

GOULD & EBERHARDT No. 72-H Universal Hobber is a manufacturing type hobber especially developed for rapid and accurate production of spurs, worms and single and double helicals. Cuts to 80-in. diameter with support removed. Face capacity, 20 in. Pitch capacity, 1½ d.p. in steel. (Gould & Eberhardt.)

AT RIGHT AND BELOW

HUT-O-LAP Gear Lapping Machine is a new design employing the inclined axis principle for the simultaneous lapping of two or more gears on the cluster type.



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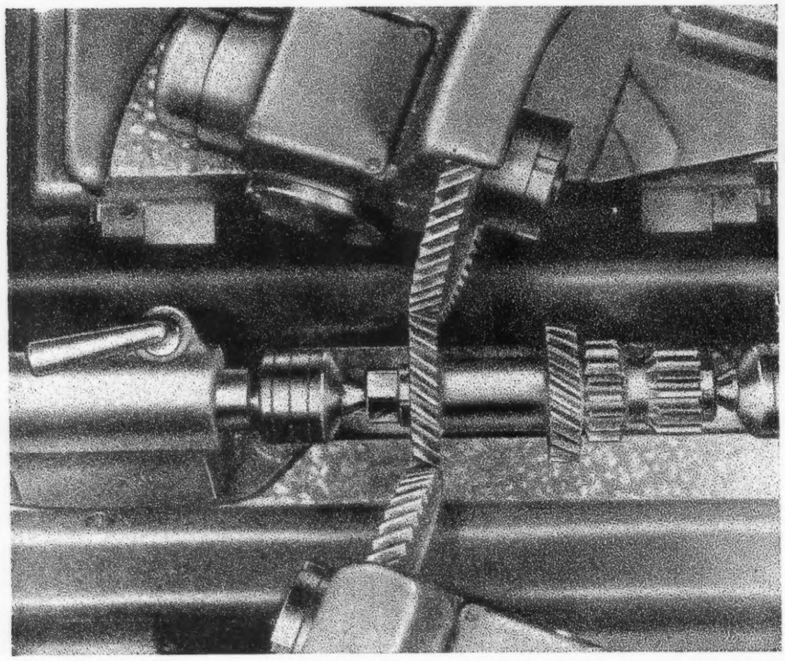


THE Hut-O-Lap will process both spur and helicals and both right and left-hand members of herringbone gears simultaneously. Fully automatic. (Carborundum Co., Hutto Division.)

o o o

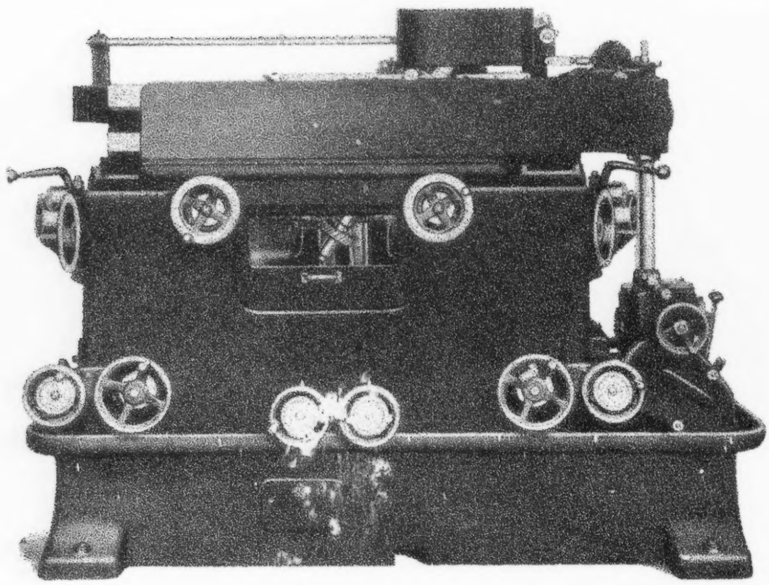
GROUND GEARS

The modern gear is precision ground—travels at high speed—transmits heavy loads. Wherever gears are used, hardened and ground gears do a better job. They are going into every conceivable mechanical product. We will show two high speed production gear grinders in Cleveland—both in full operation. See these new machines and the work they do. If your product contains gears you should know all about this accurate finishing process. We will be glad to show you.

BOOTH № 906

PRATT & WHITNEY CO.

HARTFORD, CONN.



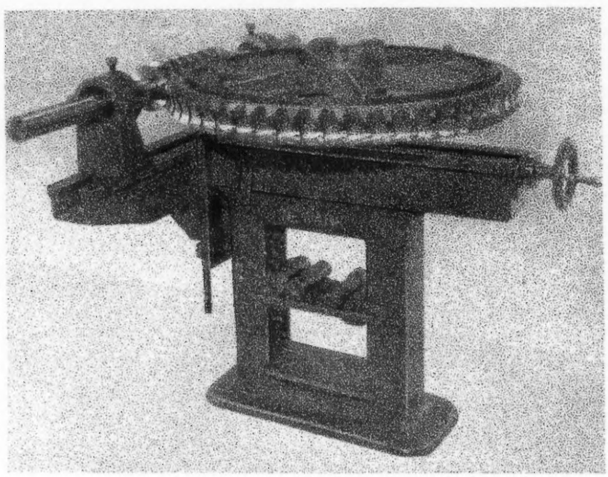
AT LEFT

LEES-BRADNER 2-H S. Gear Grinder is an innovation in design which makes it possible to grind both sides of the teeth on spurs or helicals simultaneously and also to grind right and left helicals to 45 deg. Machine uses the generating method and exceptional accuracy as well as fast production rate are claimed. (Lees-Bradner Co.)

o o o

BELOW

NEWARK No. 1 Gear Tester is designed for simplifying the testing of worms, worm wheels, and for testing helical and spur gears through the use of an auxiliary head. Height of the work enables easy inspection of rolling action. (Newark Gear Cutting Machine Co.)



(CONTINUED FROM PAGE 166)

considerably on working conditions in the particular area. Management might be expected to protest most strenuously an increase of 100 per cent in kilowatt-hour cost of electrical current, but measured in terms of light intensity, dirty equipment increases the cost of current per foot-candle produced by at least as much. It would be more economical to use lamps of but half the capacity of those normally used and keep fixtures clean. The general standard of lighting would be greatly reduced, but at any rate full value in the form of light would be received for the cost of current.

Definite Cleansing Schedules

We have established definite cleansing schedules in our plants. Foot-candle meter readings are taken after equipment has been cleaned and relamped and when the intensity of illumination falls to about 80 per cent of this value the equipment is again cleaned. Our experience indicates that the cost of cleansing is but an insignificant amount as compared to cost of current as measured in terms of light intensity when equipment is dirty.

Factory areas should not be permitted to reflect a gloomy atmosphere through lack of paint. We attach much importance to color combinations because of the effect on general illumination. Ceilings are painted a light color—white wherever it is practicable. Side walls are finished in medium tones of buff or green. All surfaces are finished in flat colors where direct reflection is objectionable.

Voltage rating at the socket plays an important part in the performance of an incandescent lamp. The wiring system should be of ample capacity, for if a lamp is burned 5 per cent under voltage its light output will be decreased approximately 15 per cent. Moreover, under such conditions, the light is inferior in color quality since lamps burn with a duller color as the filament temperature is reduced below normal operating level.

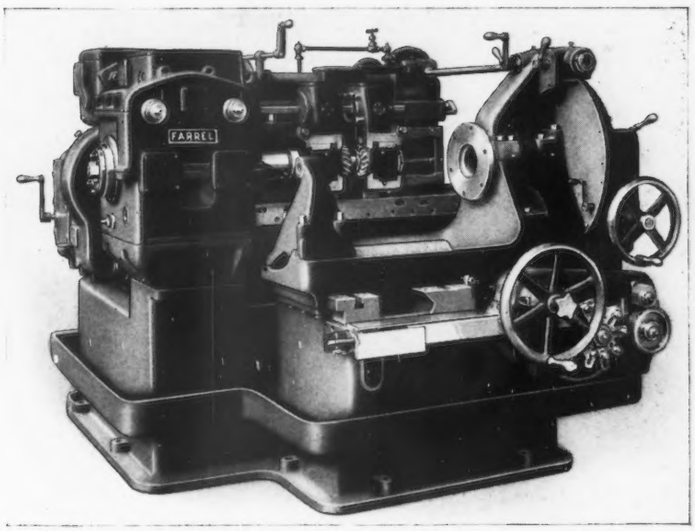
An adequate lighting system maintained in proper condition is a good investment in any manufacturing concern through the contribution it makes in improving quality of product, reducing spoilage, increasing production, reducing accidents and decreasing labor turnover.

(CONTINUED ON PAGE 180)

FARREL-SYKES GEAR GENERATORS

For the latest developments in gear generating see the Farrel-Birmingham exhibit at the Machine Tool Show

BOOTH NO. 105-A



Size 2-B Farrel-Sykes Gear Generator. Capacity: 0 to 25″ dia.; 0 to 8″ face; 24 to 3 D.P.; maximum cutting strokes 700 per minute.

Improved Design Improves Performance

In the design of the latest type of Farrel-Sykes Gear Generators full utilization has been made of the technical progress of the last few years.

The improvements in design are noteworthy but most important is the improvement in performance. New features enhance accuracy of the product, increase output and facilitate operation.

Fast Quiet Accurate

The new Farrel-Sykes Gear Generators have extreme rapidity of action, yet they are remarkably quiet in operation. They are built with initial precision of the highest order, and maintenance of precision is ensured by the use of hardened, ground and lapped surfaces where wear is likely to affect precision, and by the provision of means of compensating for wear.

Productive Easy to Operate

A new automatic in-feed mechanism on the No. 1-A and 2-B machines makes them fully automatic except for setting up and changing the work. The latest type of cutter relief mechanism not only permits higher operating speed, thus increasing production, but also improves materially the accuracy and finish of the work and greatly lengthens the life of the cutters.

Versatile Economical

Farrel-Sykes Gear Generators are not limited to cutting continuous herringbone teeth, but will generate any known type of herringbone gear, as well as straight tooth and single helical gears, external and internal, and a variety of toothed forms and special contours.

When cutting straight tooth or single helical gears the use of two cutters simultaneously permits roughing and finishing one gear, cutting two like gears, or cutting two entirely dissimilar gears at the same time. Two members of a cluster gear, such as are used in automobile transmissions, can be cut simultaneously. With six cutters three gangs of gears can be cut at once, giving a very high rate of production.

The Sykes machines are the most universal of gear generating machines and do a wider range of work with greater facility, speed, accuracy and economy than is possible by any other equipment at present available.

See them at the Show

If you make or use gears don't fail to see these machines at the Machine Tool Show. Our engineers in attendance will be glad to explain details of design and to demonstrate the operation of the machine.

FARREL-BIRMINGHAM COMPANY, INC.

333 Vulcan St., Buffalo, N. Y.

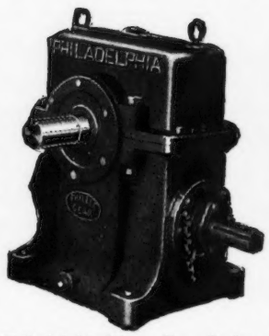
MODERNIZE and ECONOMIZE with

Philadelphia Power Saving Products

Philadelphia Herringbone Speed Reducer

Philadelphia Speed Reducing Units

Many firms have found these units provide the most economical method of transmitting power from prime mover to driven machine. Philadelphia Speed Reducers are made in worm, herringbone, spur, spur and bevel, and spiral-bevel herringbone gear types, and will meet any requirement for straight line, right angle or vertical drives. They are compact, quiet, safe, dirt and moisture proof and will give long efficient service without trouble.



Philadelphia Worm Gear Reducer

Philadelphia Horizontal MotoReduceR

The Philadelphia MotoReduceR

These modern single-unit drives combine in one housing both motor and speed reducer. They are so compactly constructed that they take up very little floor space, and being in one unit, they require no separate base plate. Time for installation and alignment is reduced to a minimum. The units possess great strength and rigidity and operate with practically no noise or vibration. Their 97% efficiencies make them extremely economical to operate.

The MotoReduceR is made for both horizontal and vertical drives in single, double and triple types.

Philadelphia Vertical MotoReduceR

Philadelphia LIMITORQUE CONTROL

This new and different valve operating device has been installed and is working satisfactorily in more than a thousand plants and industries throughout the country, to take care of both normal and emergency conditions. The Limitorque Control automatically holds to a predetermined limit the torque applied to the valve. It is compact and totally enclosed, thus assuring trouble-free operation.

Philadelphia Limitorque Control

PHILADELPHIA GEAR WORKS

Industrial Gears and Speed Reducing Units

Main Office and Works—Erie Ave. and "G" St., Philadelphia, Pa.

New York—330 W. 42nd St. Pittsburgh—Chamber of Commerce Bldg.

☐ Have your representative call on me.

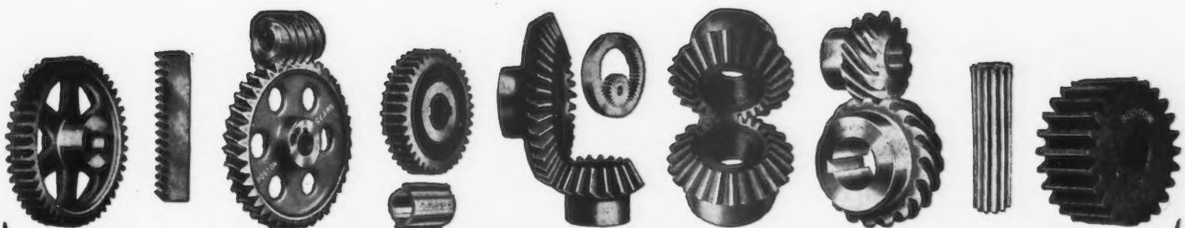
Send me literature on the following:

☐ Worm Gear Reducers ☐ Herringbone Reducers ☐ The MotoReduceR ☐ Limitorque Control

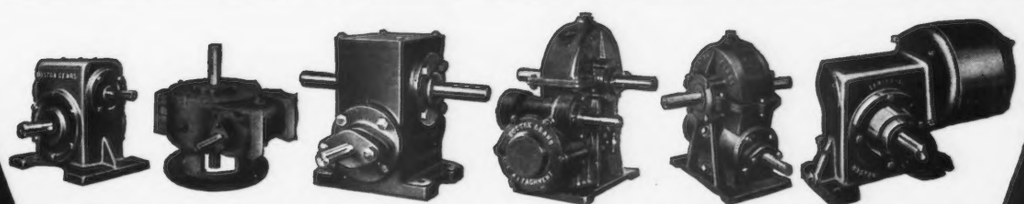
Mr. ..... Title .....

Firm ..... Address .....

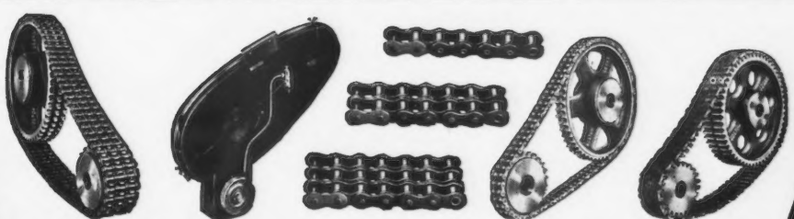
IA-9-5-35



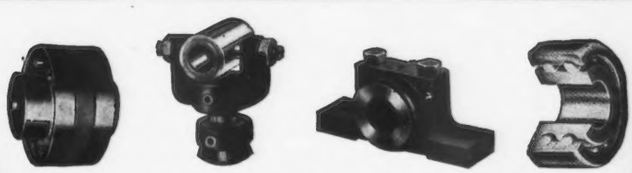
GEARS—SPUR, WORM, BEVEL, INTERNAL, MITER, SPIRAL, NON-METALLIC, ETC.



SPEED REDUCERS—HORIZONTAL, VERTICAL, PARALLEL, MOTORIZED, COMPOUND, ETC.



CHAIN DRIVES—ROLLER, SILENT. CHAINCASES, SPROCKETS, ETC.



MISC.—BALL BEARINGS, JOINTS, COUPLINGS, ETC.

COMPLETE STOCKS ALWAYS NEAR YOU!

● **Power transmission products in thousands of *stock* types and sizes, ready for *immediate shipment* at Boston Gear distribution centers from coast to coast.**

Send for Catalog 1A950 containing specifications, prices, and addresses of distribution centers.

BOSTON GEAR WORKS, INC.

North Quincy, Massachusetts, U. S. A.

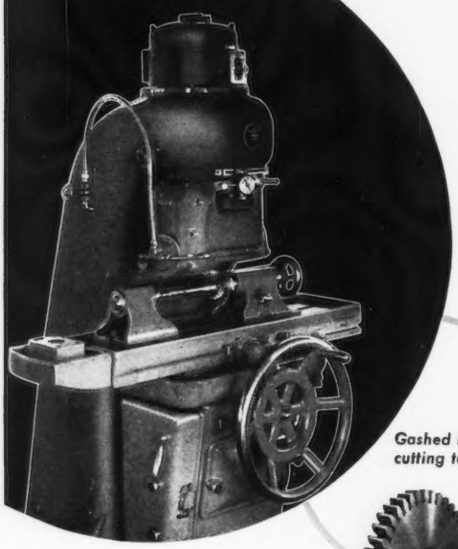
MEMBER OF AGMA

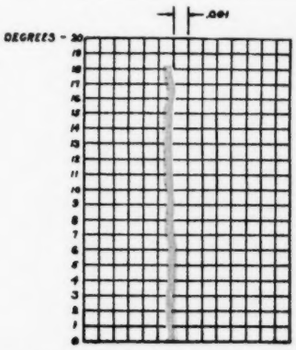
Direct Factory Branches in Boston, New York, Philadelphia, Cleveland, and Chicago. Sales Offices in Utica, N. Y., Dayton, Ohio, Springfield, Mass., Greensboro, N. C., and Minneapolis, Minn.

A. T. & T. Co. Teletype—QCY MASS 242.

BOSTON GEARS

Corrects GEAR TOOTH PROFILE INDEX ECCENTRICITY AND HELICAL ANGLE





Errors in tooth form reduced to less than a "tenth"

The Red Ring Gear Finishing Machine makes available in commercial gears the same accuracy, silent operation and long life characteristic of high quality automotive gears. It is a practical and very economical means of gear tooth correction.

Operation is fully automatic, requiring no particular skill in the operator. Floor to floor time is only about 10% of that required to finish a gear by means of a light cut on a standard gear cutting machine. A 20 tooth gear with 9.25 pitch, 20° pressure angle and 35° helix angle is usually finished in 20 to 40 seconds (floor to floor).

The machine is always under complete control and operates with the same standard of accuracy noted in diamond boring.

For further details write for bulletin on this machine.

Gear and tool in mesh.

Gashed helical cutting tool.

PATENTS APPLIED FOR AND ISSUED • 1989650 • 1989651 1989652

NATIONAL BROACH AND MACHINE CO.

SHOEMAKER AND ST. JEAN DETROIT, MICHIGAN

(CONTINUED FROM PAGE 176)

In addition to furnishing proper tooling, materials, handling facilities, etc., and maintaining a clean, orderly, well-lighted plant with adequate safeguards for the protection of workers, management's share in helping to secure the largest return on investment in manufacturing equipment includes the keeping down of overhead. In this connection the General Electric Co. has utilized a method of controlling indirect manufacturing expense through the use of variable departmental budgets.

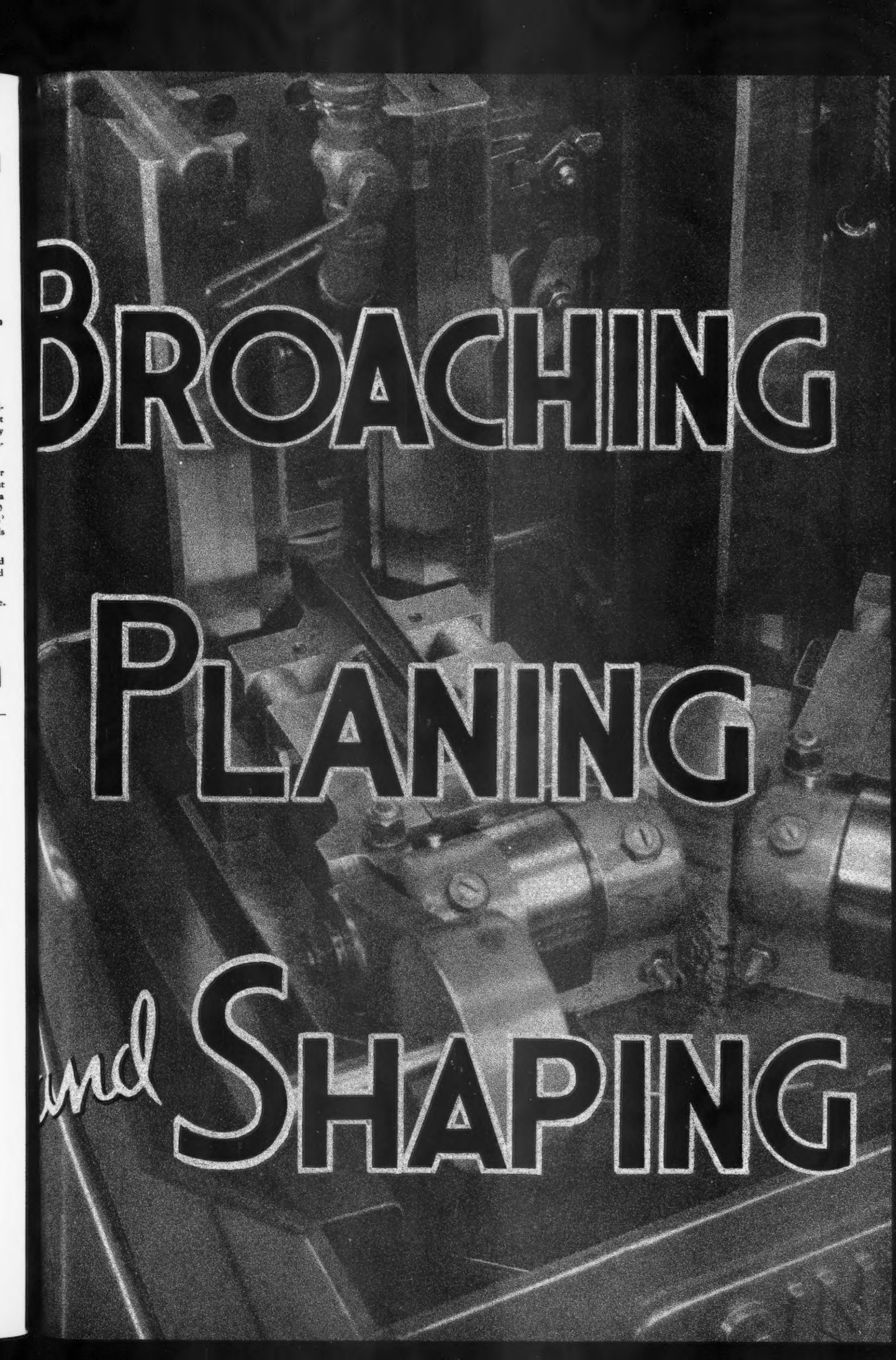
Since indirect manufacturing expense is the cost of service or services rendered to expedite production, it seems logical that the amount of expense should bear a definite relation to volume of production so long as character of production does not change. The budget is, therefore, an expression of the relationship between volume of production and volume of indirect manufacturing expense at all volumes of production. The General Electric Co. uses "direct labor" as the measure of volume of production, and each of the 400 departments of its apparatus works is operating on its own expense budget.

Certain types of expenditures, such as for helpers and laborers, maintenance of machine tools, inspection tools, etc., bear a constant percentage relationship to volume of production, and are considered to be strictly variable. Other types, such as for clerical work, supervision, power, heat, etc., vary to some degree with volume of production but not directly. These are said to be semi-variable or to be composed of a fixed and a variable element. Certain expenditures such as executive supervision, maintenance of buildings, insurance, depreciation, etc., are independent of production volume, and are, therefore, considered as fixed expenses. The composite of these three types of expenditures for a particular department is a schedule that has a fixed and a variable element. The budgeted expense can, therefore, be accurately represented by a simple equation which includes the measure of volume of production (as expressed in direct labor) and the fixed and variable elements of expense.

Departmental Budgets

Very careful consideration is given to the preparation of departmental budgets. They are prepared in detail by the department supervisor, approved by his immediate supervisor and the works manager and finally by the manufacturing general office, and represent what may be termed "preplanned operation." A weekly check is made of estimated and actual expenses and any discrepancies justified or cleared up. It is this continuous checking of estimated and actual expenses against a predetermined "bogey" that keeps the factory supervisory personnel cost conscious —a condition essential for effective expense control. For the first six months of 1935 our realization was 99 per cent of the budget allowances, and was conservatively estimated at 14 per cent less than the probable expenditures would have been if we were operating without

(CONTINUED ON PAGE 188)


BROACHING
PLANING
and SHAPING

At BULLARD Booth 205

SEE

ROTO-BROACH

TRADE MARK REGISTERED

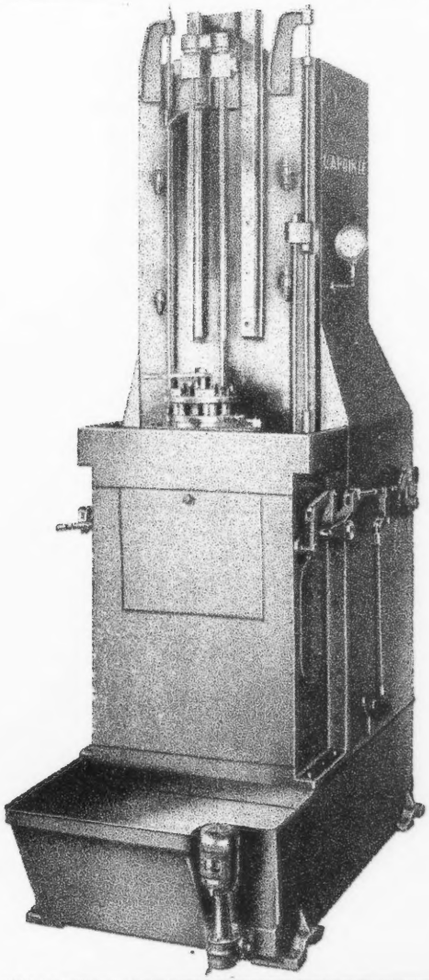
THE BULLARD COMPANY

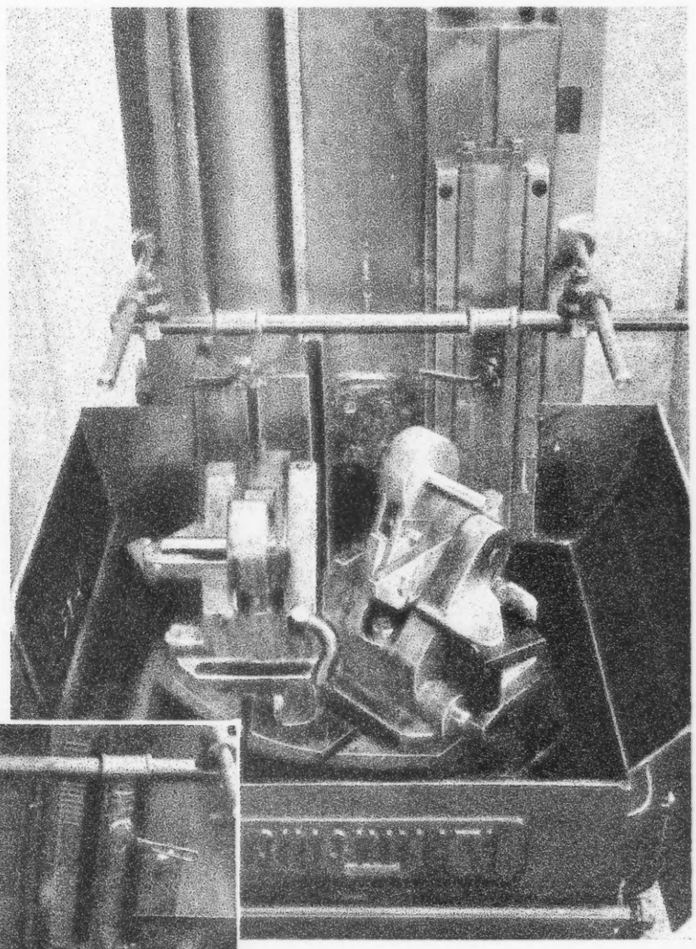
Bridgeport **Connecticut**

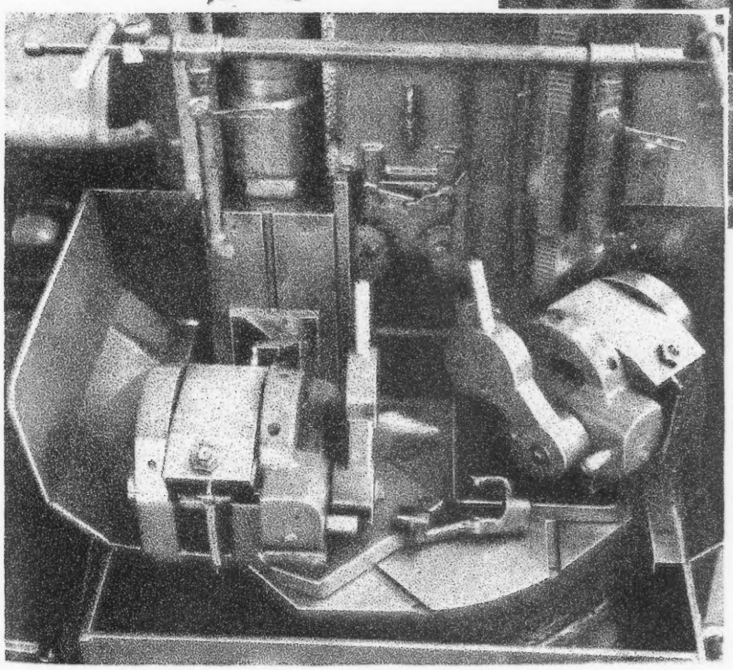
o o o

AT LEFT

V-TYPE Vertical Hydraulic Broaching Machine designed to pull broaches downward through the work. Work can be submerged completely in coolant, higher cutting speeds being, therefore, available. Indexing of simple locating fixture can be used. Ten, 15 and 25-ton capacity machines are built. (Lapointe Machine Tool Co.)





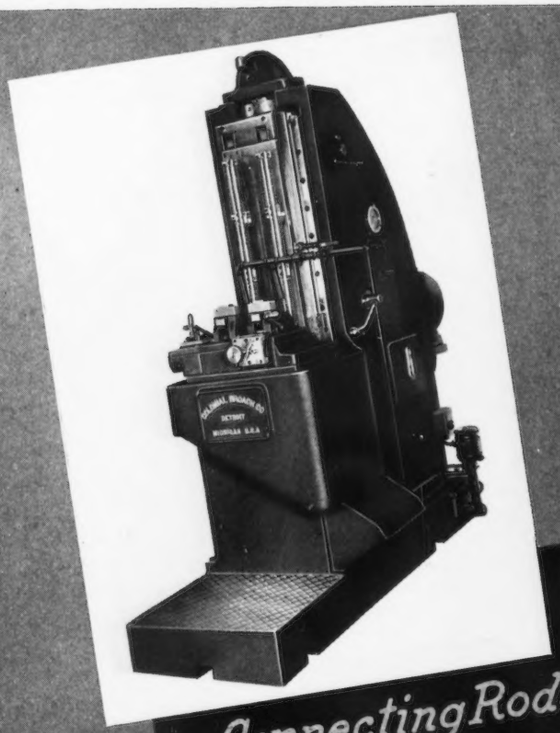


ABOVE AND AT LEFT

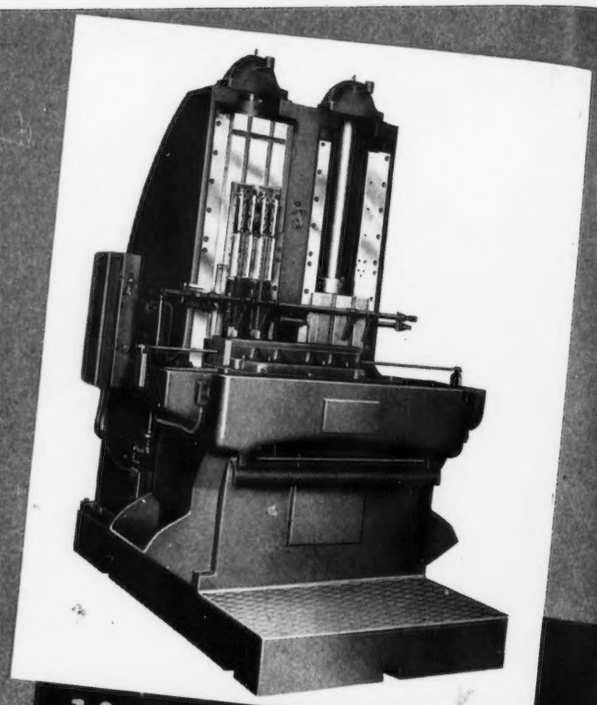
CINCINNATI Hydro Broach Machines are built in three sizes: 2, 5 and 10-ton capacity. Normal strokes are 36, 42 and 54 in. respectively, but extended strokes may be obtained. Machines have an unusually fast cycle and are completely hydraulic in operation. Also automatic lubrication. (Cincinnati Milling Machine Co.)

o o o

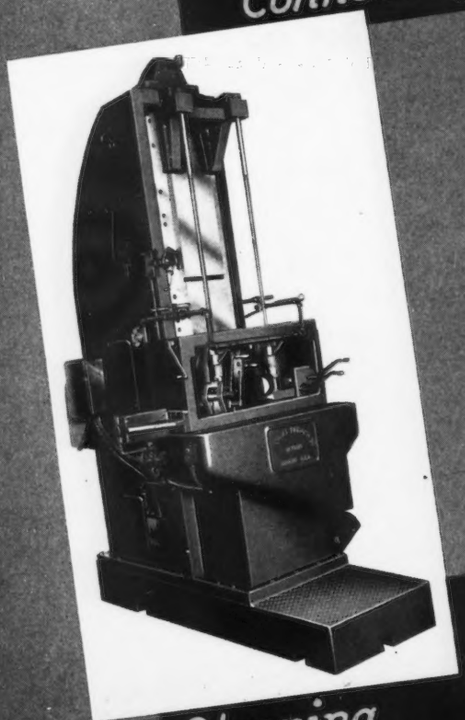
Colonial Broaching Machines an



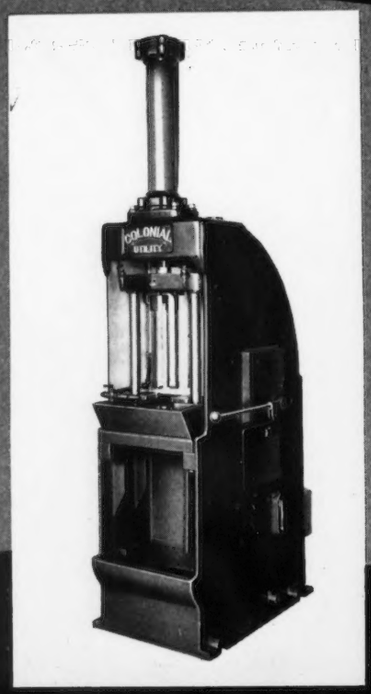
Connecting Rods



Universal Trunnions



Steering Housings

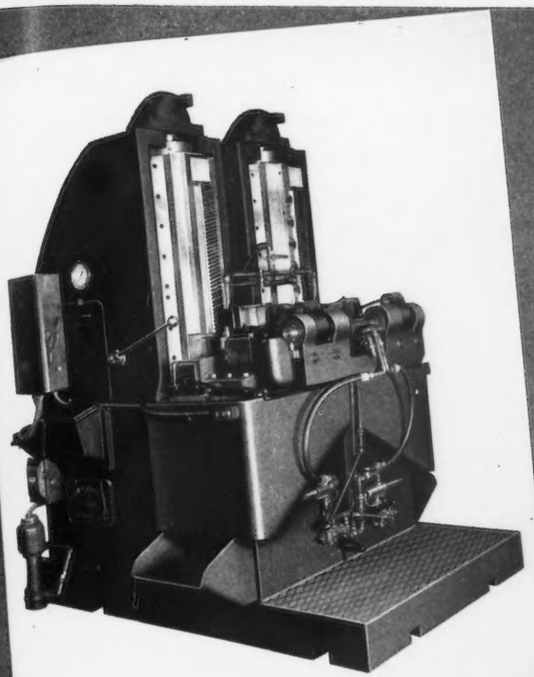


Balancer Plates

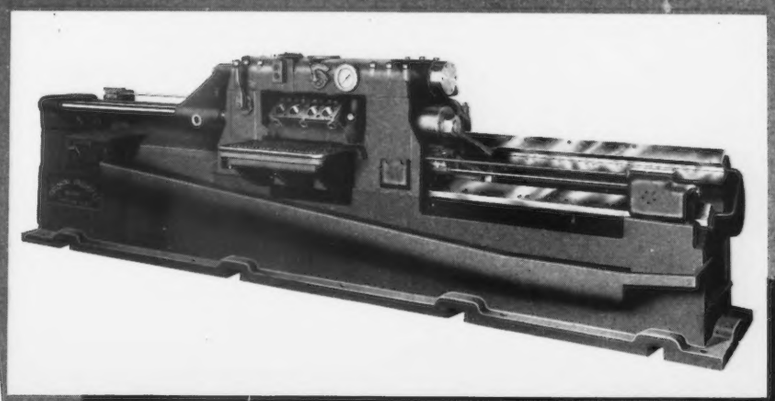
Bearing Caps

COLONIAL BROACH COMPANY DETROIT, MICH.

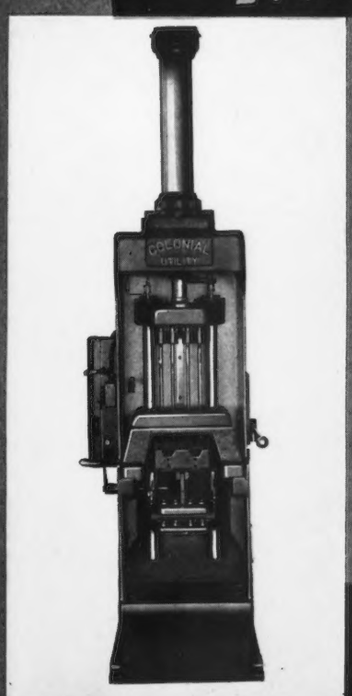
s and Tools for every Purpose



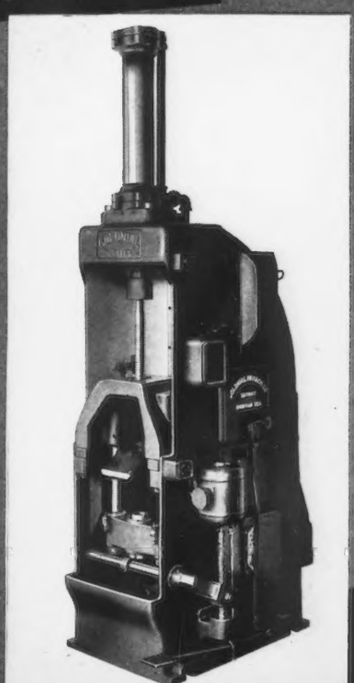
Front Axles



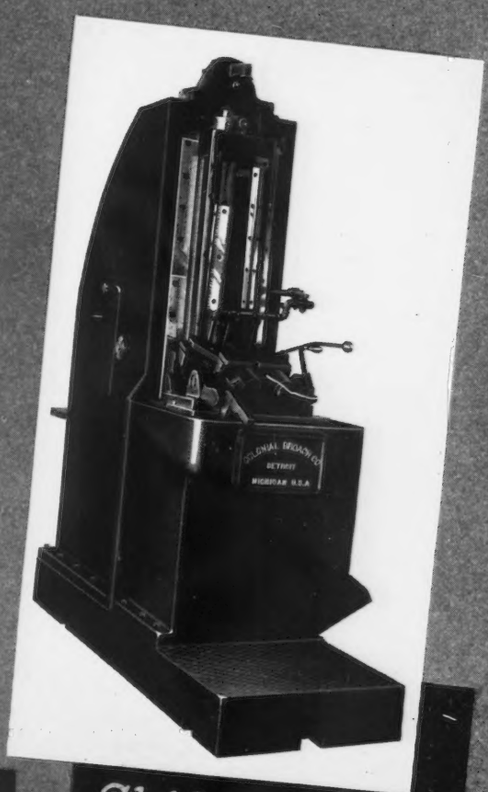
Cylinder Blocks



Valve Guides

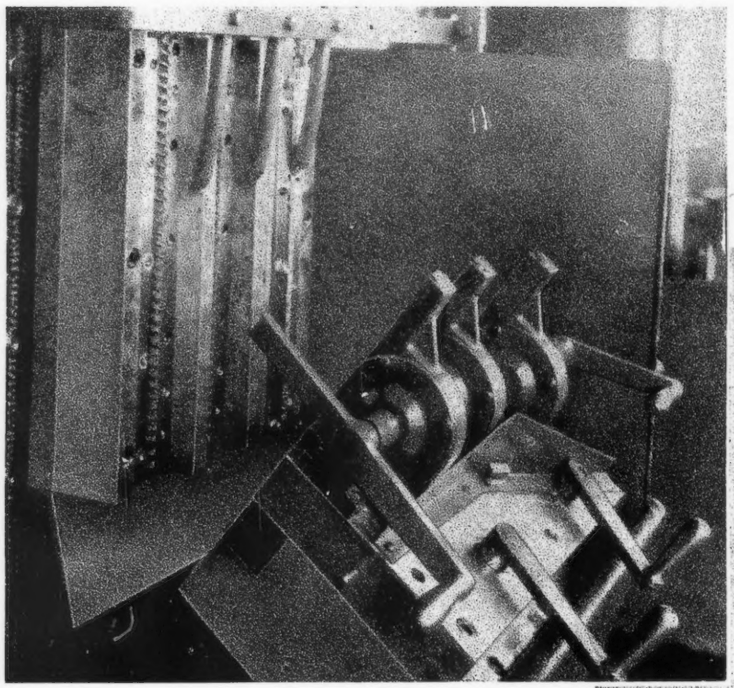


Sizing Gears



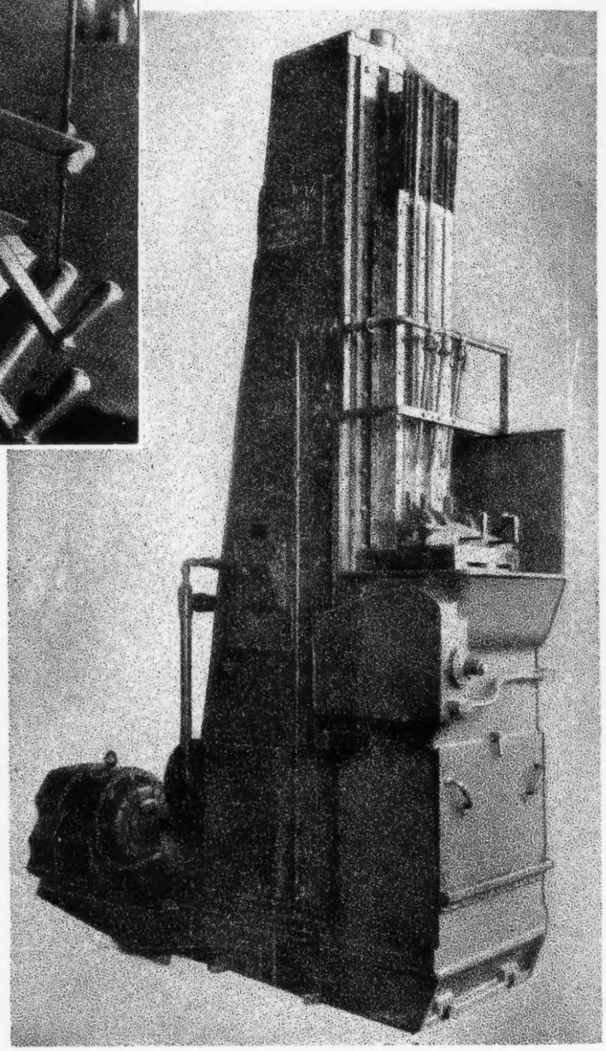
Shifter Forks

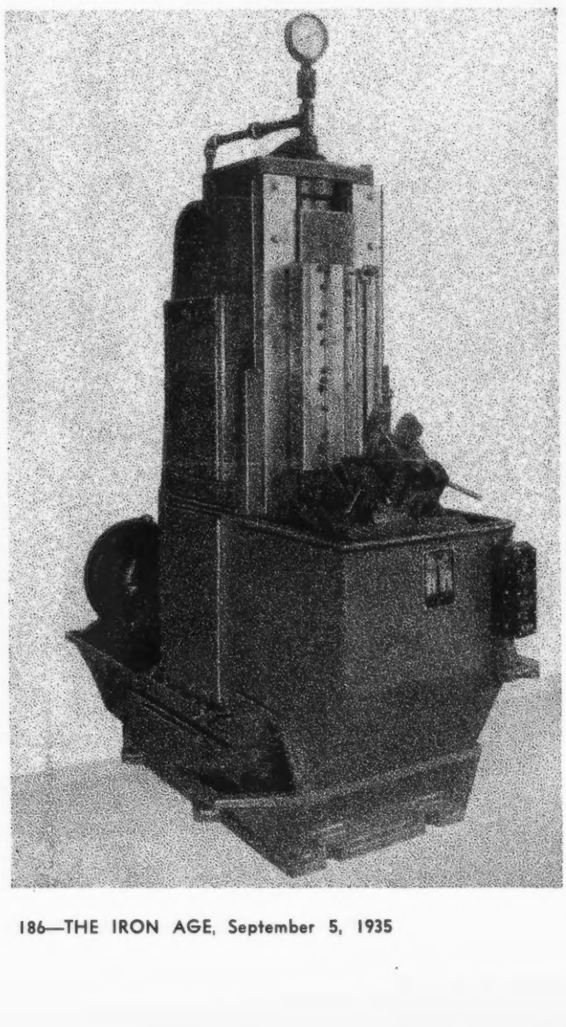
COLONIAL BROACH COMPANY DETROIT, MICH.



AT LEFT AND BELOW

AMERICAN 52-in. Vertical Surface Broaching Machine, with 35-ton capacity, is a recent addition to the company's line. The machine illustrated was tooled for broaching the guide rail on transmission shifter forks and achieved a production rate of six pieces per minute. The broach holder was arranged to hold three sets of broaches. (American Broach & Machine Co.)





AT LEFT

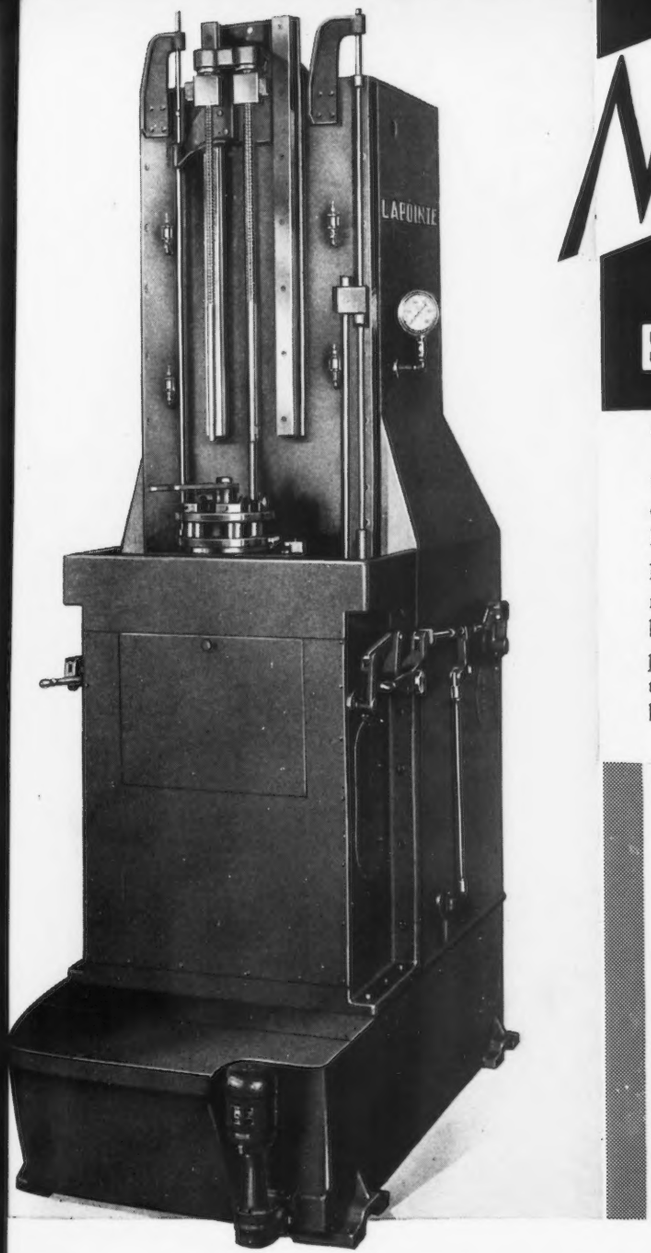
AMERICAN SB-18-4 Vertical Surface Broaching Machine is also an addition to the company's line with 18-in. stroke and 4-ton capacity. Machine is shown equipped with an automatic tilting fixture for broaching several parts at once. (American Broach & Machine Co.)

o o o

NEW... LAPOINTE *High Production* BROACHING MACHINES

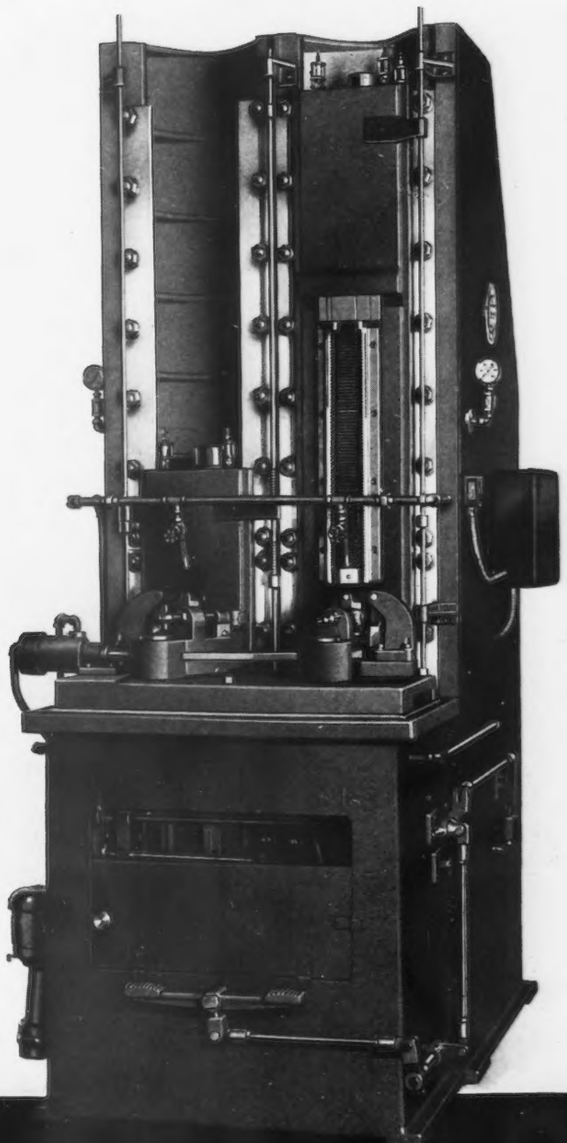
THE world's leading Manufacturer of Broaching Equipment will have these Machines in operation on a variety of work supplied by its various customers. See these machines in actual operation. Make a note of our location—ARCADE BOOTH "D".

Perhaps the machines exhibited here will not suit your particular requirements. However, these machines are modern developments and are built in several different sizes and capacities. Remember, too, that the experience in the design and development of broaching equipment, behind these machines, is available to our customers and we will gladly study your broaching problems and produce the necessary equipment for your needs.



A-- Lapointe V-type Vertical Hydraulic Broaching Machine. igned to pull the broaches downward through the work. Re- rs less floor space than horizontal type of machines of like cap- . In most cases the work can be completely submerged in the ant solution allowing a higher cutting speed. An outstanding re is the handling of the broaching tools automatically, allow- the operator to give more attention to his work. This method vides considerable increased production capacity as the idle time ch end of the stroke is practically eliminated. The machine n is equipped for broaching Universal Joint Sleeves, obtaining oduction of 250 pieces complete per hour. The cutting speed riable, the maximum being 24′ per minute. Capacity 30 tons. gth of stroke accommodates broaches 60″ overall length.

B-- Shows a new Lapointe 12-ton 42″ stroke Duplex Hydrau- Surface Broaching Machine equipped for surface broaching five ces on Universal Joint parts, removing 160″ of metal on each ce, obtaining a production of 300 parts complete per hour. ipped with an automatic fixture which also clamps the work e automatically and can be arranged for automatic cycling. The er distance between the broach slides is 20 inches.



THE LAPOINTE MACHINE TOOL COMPANY
Hudson, Massachusetts, U. S. A.

What's YOUR Broaching Problem?

Of late years, broaching has become a highly important factor in economical production. Once limited to simple internal operations, it is now used in complex combination jobs, both internal and external—has replaced reaming in many cases—has proved successful in finishing long bores—has even supplanted milling, in certain external machining operations.

CONNECTICUT

PRECISION BROACHES

Have kept pace with broaching progress. More than this, they have pioneered in many of the new broaching processes. In all cases they have proved to be **PRECISION** tools, measured by industry's most rigid standards. * * * Try **CONNECTICUT PRECISION BROACHES** in *your* production. Test them by whatever standard you will. Prove their ability to stand up to your most exacting **PRECISION** demands. * * * And if you have any peculiar or difficult operations where broaching is, or *might be* employed, let us discuss them with you. Avail yourself, without obligation, of our pioneer experience in broaching.

Send us your specifications—with sample or blueprint

CONNECTICUT BROACH AND MACHINE COMPANY

25 PEQUOT AVE. NEW LONDON, CONN.

(CONTINUED FROM PAGE 180)

variable departmental control or some equally effective plan. "The proof of the pudding is the eating," and a 14 per cent reduction in controllable overhead represents a very substantial figure as expressed in dollars.

Space does not permit a discussion of such important subjects as machining rates, job evaluation, selection, use and care of cutting tools, motion study analysis, control over spoilage, etc. However, in the above enough has been said, it is hoped, to show that machine tools and other types of shop equipment are to be regarded as investments, the return from which can be expected to be proportional to the effectiveness of human control.

In themselves machines are just combinations of mechanisms; hence, in use, and from an investment standpoint, they have to be "made," or given the "breaks" by human beings. Keeping an eye on the equipment investment, therefore, requires effective teamwork on the part of operators, supervisors and administrative personnel.

July Auto Production Was 337,049

WASHINGTON, Aug. 27.—The production of motor vehicles in the United States in July declined to 337,049 from 361,320 in June, according to the Bureau of the Census. Passenger car output was 276,084, compared with 296,609. Truck and road tractor output was 60,965, against 64,711. In the first seven months of the current year total motor vehicle production was 2,599,195, against 1,979,196 in the corresponding period of 1934, passenger car output being 2,148,515, compared with 1,625,295. Truck output in the first seven months of the present year totaled 450,678, compared with 353,901.

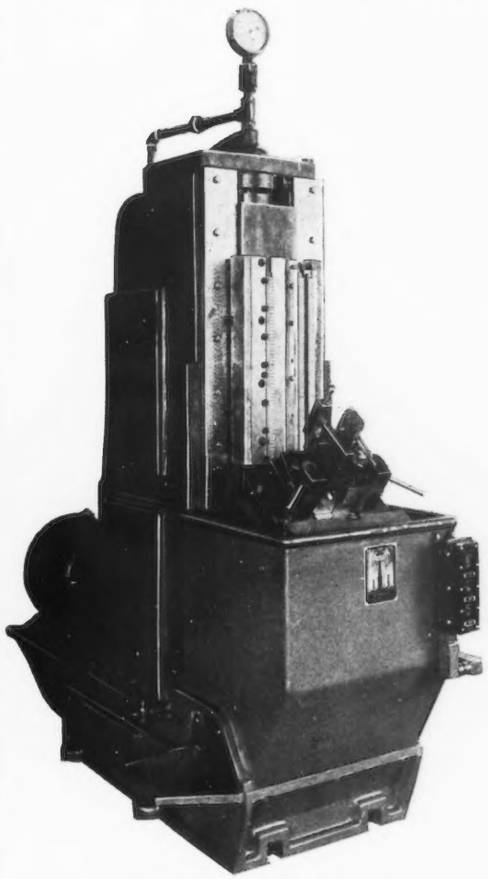
Exports of passenger cars in July totaled 16,807 units, against 20,063 in June, and in the seven months of the present year amounted to 155,986. Exports of commercial cars in July were 15,328, compared with 14,062 in June, and in the seven months' period were 91,759. Data on export movements for last year are not available.

Canadian production of motor vehicles in July totaled 13,069 units, compared with 14,062 in June. Passenger car production was 9471, against 12,276.

Truck output was 3598, against 3469. In the first seven months of 1935 motor vehicle production in Canada aggregated 124,396 units, compared with 93,198 in the corresponding period of last year.

AMERICAN

BROACH & MACHINE COMPANY



American Vertical Surface Broaching Machine. Built in several different capacities and lengths of stroke.

Broaching Machines of all types—standard Vertical and Horizontal and Special Broaching Machines. Pioneers of Vertical, Semi and Full Automatic Broaching Machines for internal broaching such as spline, square and round holes.

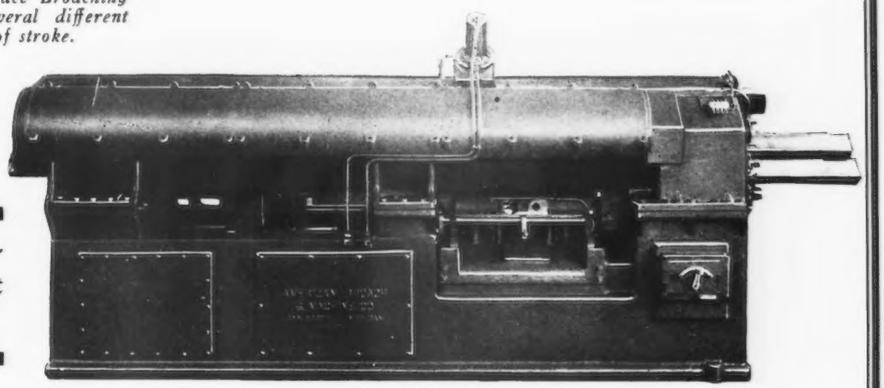
Largest producers on the market.

Surface Broaching Machines, Vertical and Horizontal, Hydraulic Presses from ¼ ton capacity to 150 ton capacity.

Broaching Tools and Broaching Fixtures of all descriptions.

We can supply you with the machines completely tooled. We offer you the services of a plant and equipment devoted exclusively to the manufacturing of broaching equipment, backed by a personnel with 33 years of experience in the development of broaching tools and machines.

Special Cylinder Block Broaching Machine.



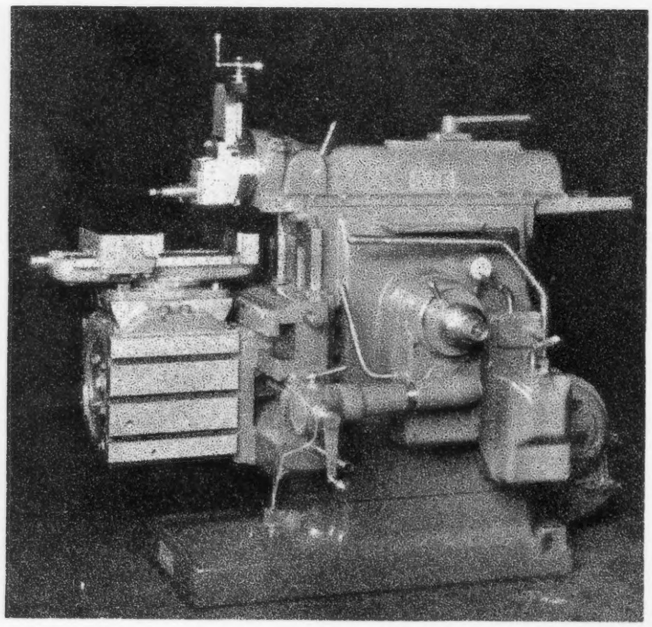
Broaching machines designed and built to meet your requirements.

AMERICAN BROACH & MACHINE COMPANY

ANN ARBOR, MICH.

F. J. Lapointe, *President*

BROACHING, PLANING AND SHAPING



AT LEFT

GOULD & EBERHARDT 14-in. and 16-in. Tool Room Shapers are designed especially for tool room work and also for small production parts where speed and accuracy are essential. Strokes range to as high as 200 per min., rapid power table traverse, automatic cross feed and pressure lubrication are provided. (Gould & Eberhardt.)

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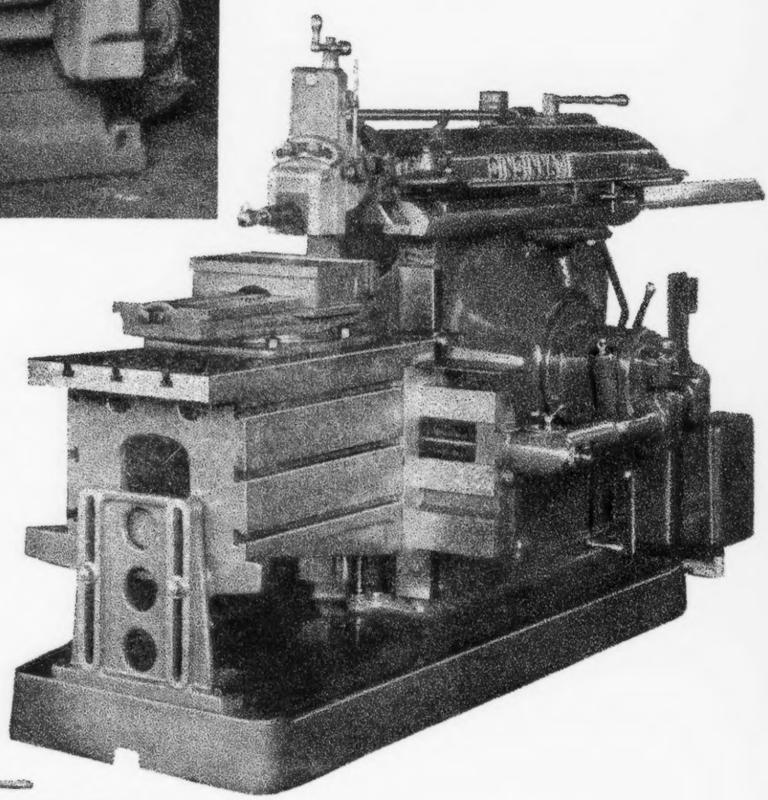
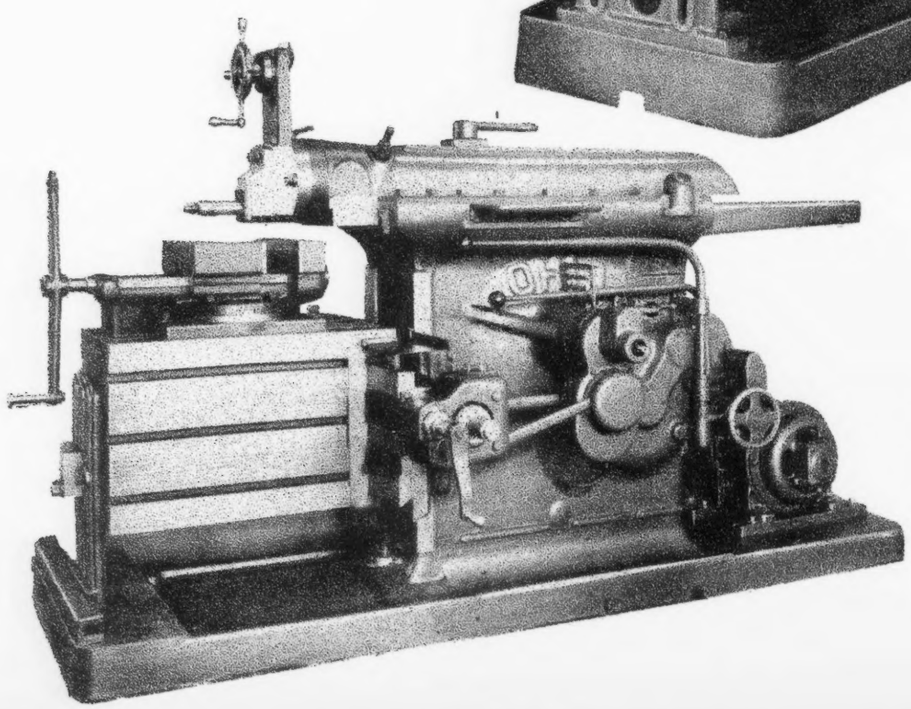


AT RIGHT

CINCINNATI Rapid Traverse Shapers have been designed to utilize new speeds and with increased rigidity for carbide tool operation. For the latter purpose, a high-speed automatic tool head is provided. Easy vision dials are incorporated. (Cincinnati Shaper Co.)

o o o



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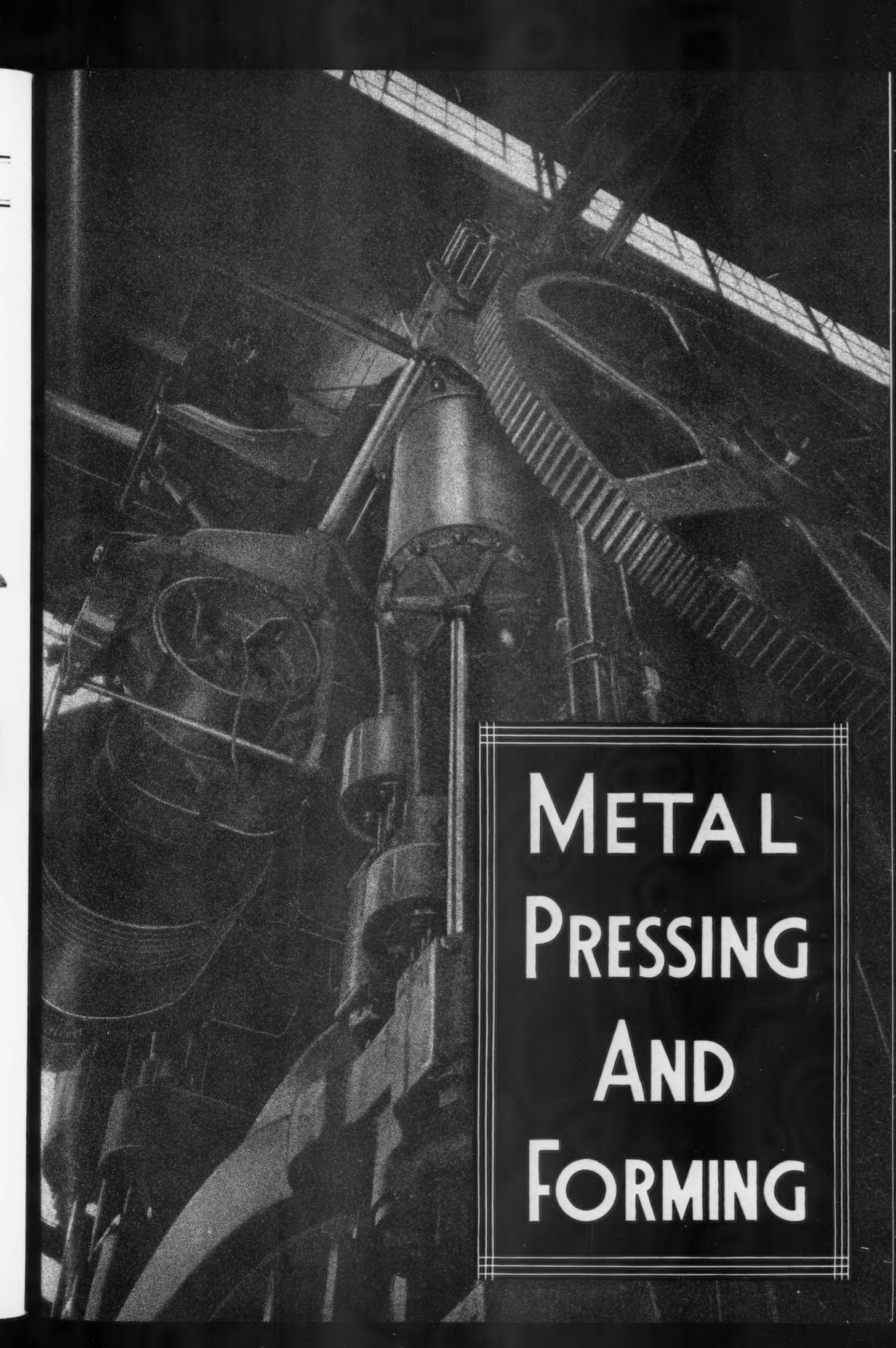
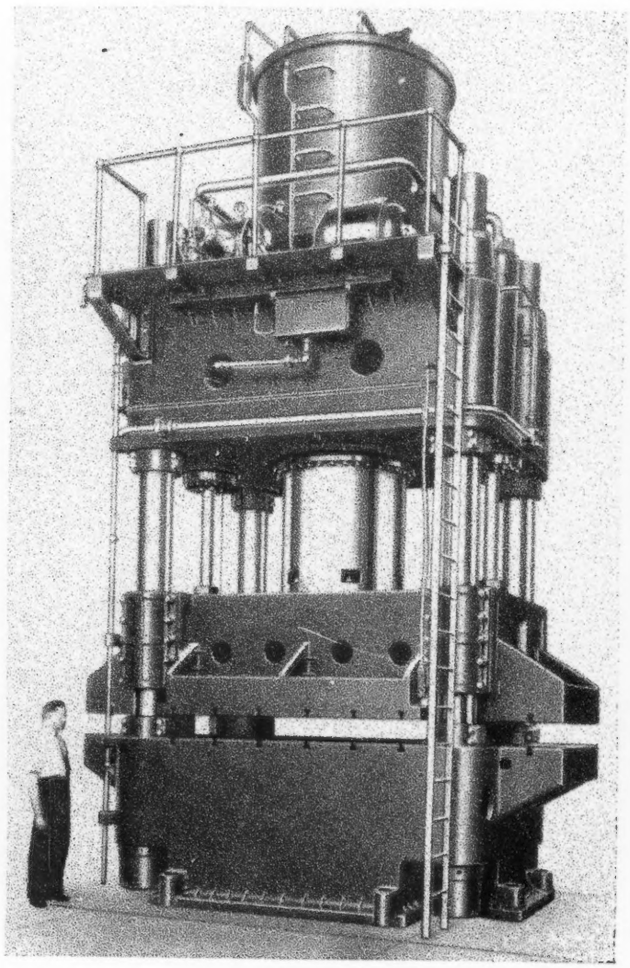
AT LEFT

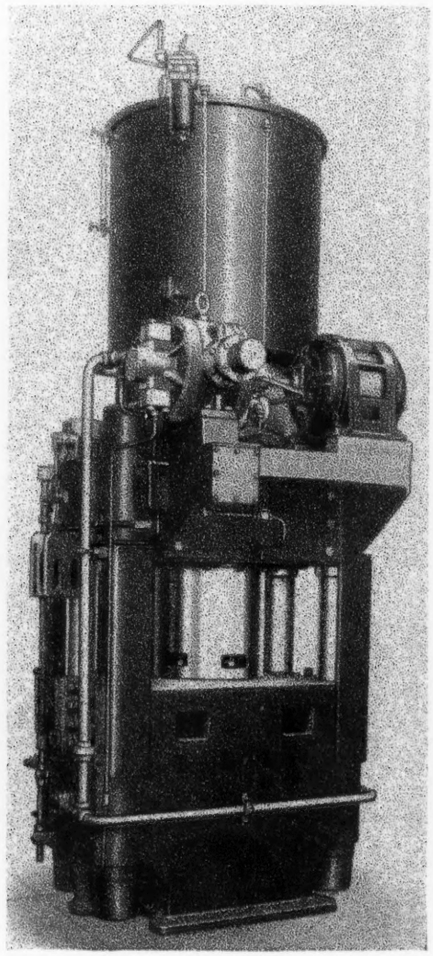
OHIO Perfection Universal Dreadnaught and Super-Dreadnaught Shapers have vee rams, new feed box and stroke adjustment dial with automatic lock and a new automatic compensating table jack. The new type table has a double tilting top. (Ohio Machine Tool Co.)



METAL PRESSING AND FORMING



H-P-M Hydro-Power Fastraverse is one of the largest and most powerful high-speed hydraulic presses yet built. It has a pressure capacity of 2000 tons and is for fabricating large metal air liner parts. (Hydraulic Press Mfg. Co.)



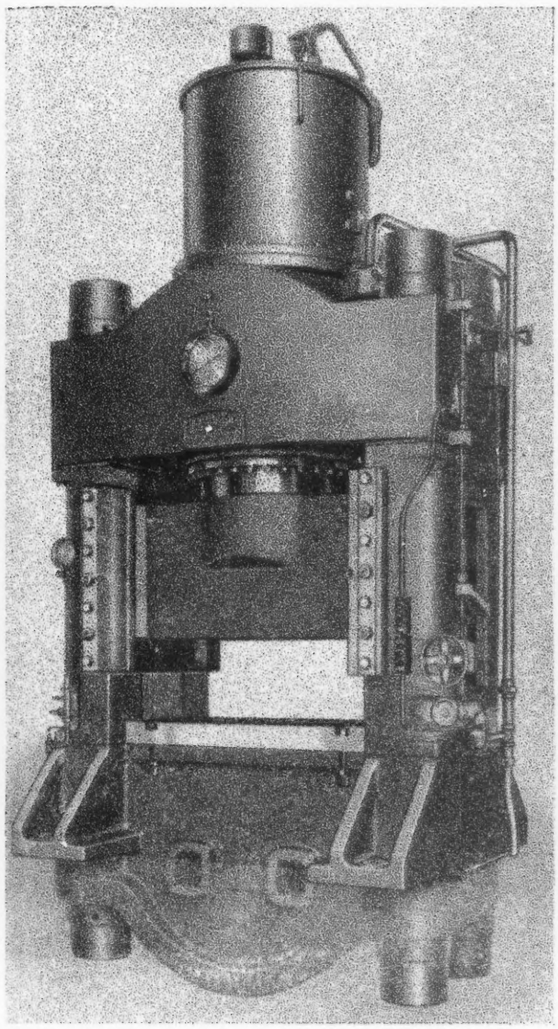
ALSO one of the new line of H-P-M Fastraverse Presses is this design of the open-rod type. This rear view shows the H-P-M Hydro-Power unit with radial pump and control compactly mounted on the press head. (Hydraulic Press Mfg. Co.)

Why Pay for Modernization Unless You Profit?

(CONTINUED FROM PAGE 47)

idea. It affords an up-to-date record that can on short notice be studied to meet changing conditions in the shop. By its use it is possible easily to study new requirements and meet needed changes in the shop in an anticipatory way so that delayed manufacturing schedules do not occur and machines are not bought hastily without full knowledge of exact requirements which often results in the purchase of machine tools that are found to be inadequate for the purpose or not the best that could have been had for the job at hand.

The matter of classifying machines in any one of the four groups, A, B, C or D, is determined by the superintendent working in conjunction with a machine tool survey committee. Their work is checked in the works manager's office. These classifications are carefully checked each time a general review is made and reclassifications are frequent. A use for a machine in class A might be found which would warrant its being reclassified in the B group. A



A POWERFUL H-P-M Hydro-Power Fastraverse Press of heavy-duty construction and with pressure capacity of 1500 tons. Closed, upright construction is employed. (Hydraulic Press Mfg. Co.)

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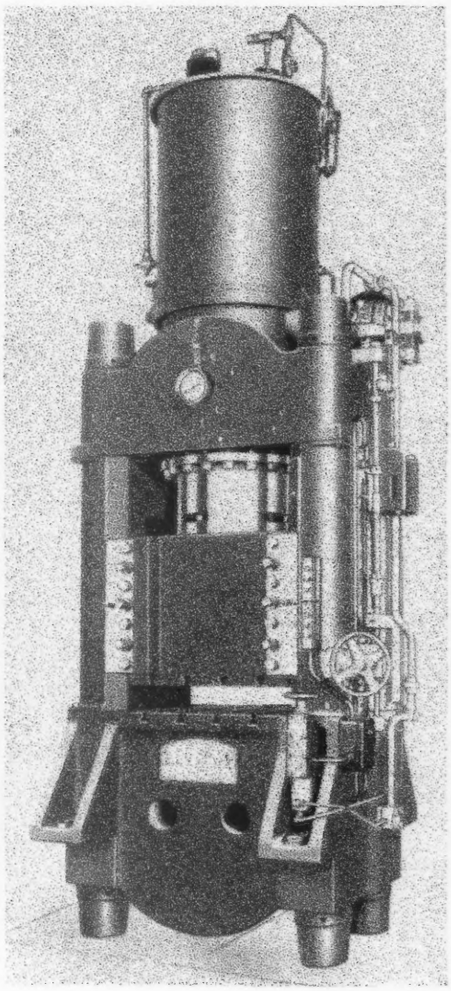


ALL functions are perfectly synchronized and coordinated in the new line of H-P-M Hydro-Power Fastraverse Hydraulic Presses. This illustrates a press of the upright type with shrunk tie rods and gib guides. (Hydraulic Press Mfg. Co.)

machine in class D may suddenly be placed in the A group, because of a change of manufacturing methods or of a product. When a machine tool is reclassified its shop equipment record is retyped.

As soon as a survey of the shop equipment record cards has been made a recapitulation in the form of a special report is drawn up which shows classes A, B and C machines. This report is the basis upon which recommendations for the purchase of new machines are made. It is drawn up by the superintendent, who reports specifically on the needs of each department. This report when assembled shows recommended expenditures under classifications A, B and C for the plant as a whole. In other words the figures form the basis of a recommended budget for the purchase of new machine tools and appurtenances.

This report is reviewed by the works manager and department heads after which it is summarized and sent to the president with a request for authorization of the expenditures. This chief executive knows that the subject has been exhaustively studied and the report is not padded in anticipation of the request being whittled down by reason of various "guesses." Further, the complete report and analysis are in writing so that full responsibility is placed squarely on the shoulders of those who are best informed as to actual shop condi-

(CONTINUED ON PAGE 198)

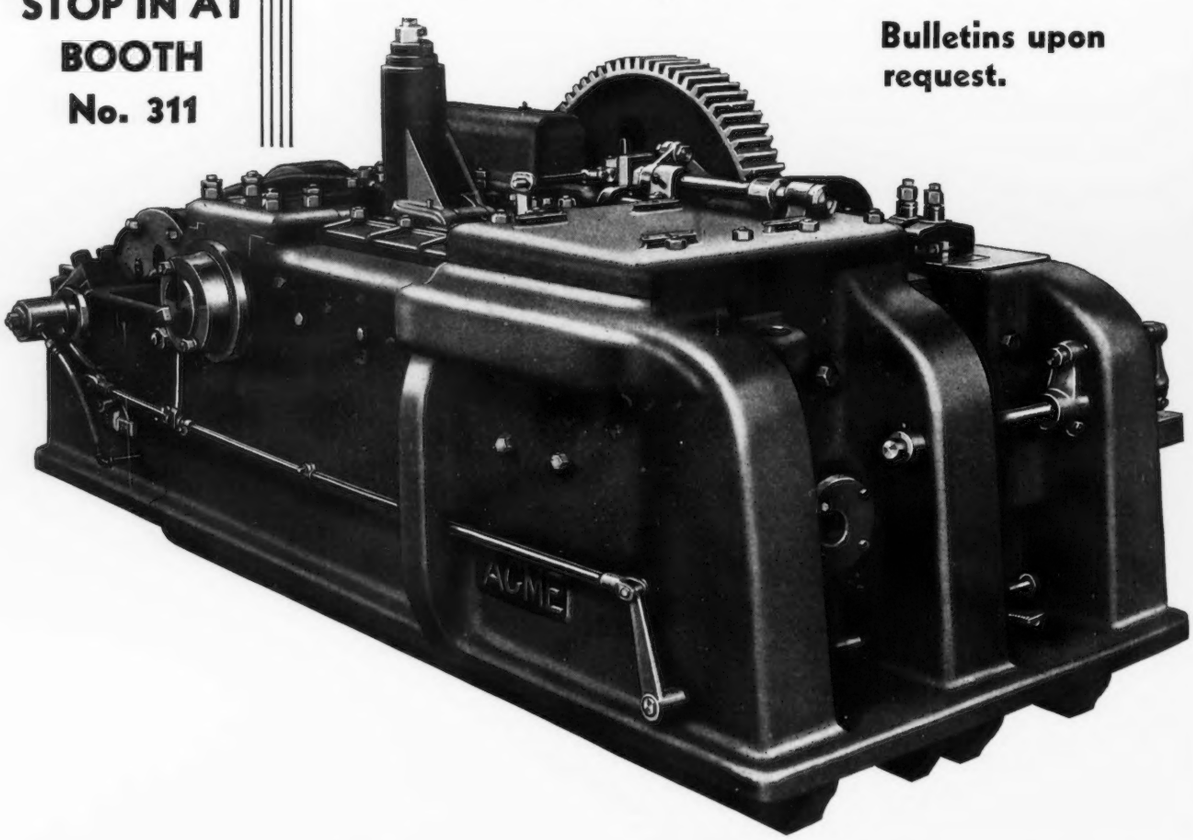
MODEL 35 ACME

CUSHIONED DRIVE FORGING MACHINE

Acme announces Model 35—A machine which is novel — distinctive — new. This new Acme represents the latest development of a complete line of all-steel heading, upsetting and forging machines. Strength, durability and ease of operation are built in. It will be on display for the first time at the Machine Tool Show. Don't miss it.

STOP IN AT BOOTH No. 311

Bulletins upon request.



THE ACME MACHINERY CO.
CLEVELAND, OHIO, U.S.A.

SHOWN FOR THE FIRST TIME AT THE MACHINE TOOL SHOW.....

MODEL 35 ACME

THREADING MACHINE

This new Acme Threader has been developed as a high production machine for work up to 2 inches in diameter.

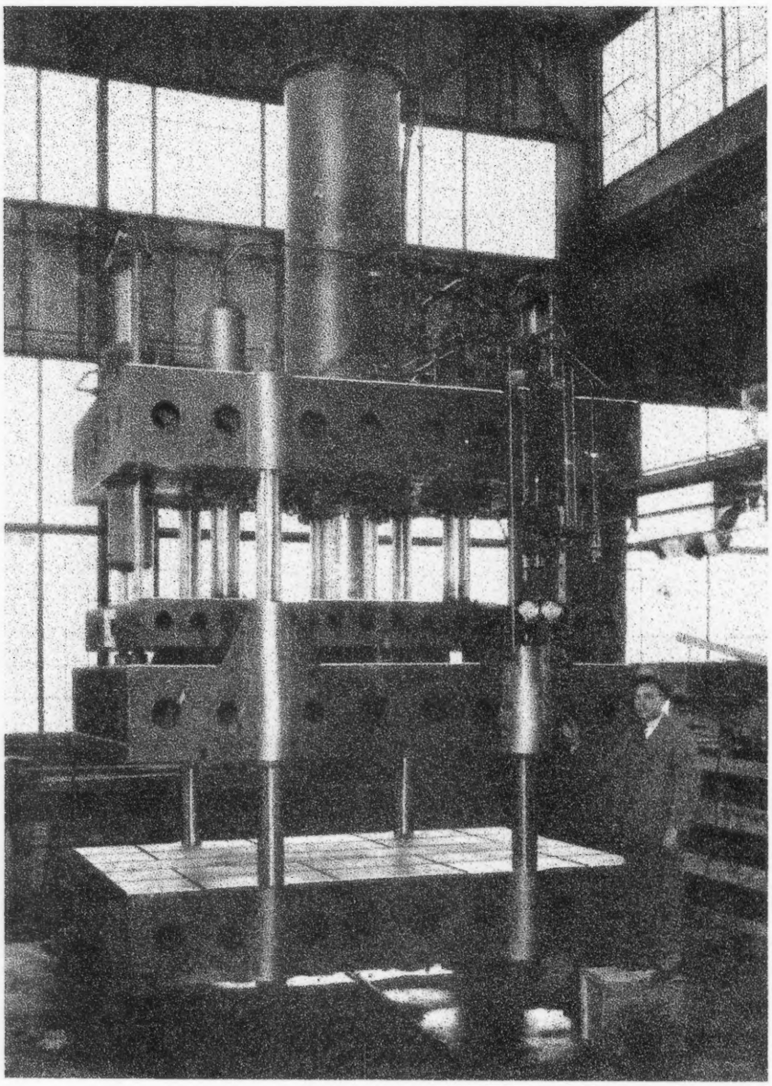
Centralized control, eight speed changes through selective type gear box, pick off gears for a wide range of pitches, automatic flood lubrication, huge reservoir in base for ample coolant and tangent type Die Head—are a few of the features that account for high productivity and continued accuracy of Acme Bolt Threaders.

Ease of operation, sturdy construction, modern streamline design provide constant, rapid production with minimum of fatigue.

Look this machine over at the show.

BULLETINS will be furnished upon request.

THE ACME MACHINERY CO.
CLEVELAND, OHIO, U.S.A.



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LAKE ERIE 250-Ton Hydraulic Forming Press, of the down-stroke type, is especially adapted to semi-production work. Easy set-up of dies, accurate control of pressures and speed and length of stroke are designed to cut cost of finished work. It was designed for body panels for trucks. (Lake Erie Engineering Corpn.)

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(CONTINUED FROM PAGE 195)

tions and needs. Also this kind of a study and report anticipates requirements and money to be spent, so that the operating department does not rush into the president's office with demands for quick expenditures which practice often results in "quick turn-downs." Expenditures are actually planned a year or so in advance, which gives further opportunity to take advantage of the very latest developments. The proof of the pudding is that since this plan was adopted in 1929 the operating department has never been turned down by the management.

Filed in the superintendent's office are duplicate purchase orders which are constantly checked against the budget allowance, thereby keeping the plan of expenditures and money available under close scrutiny at all times.

It is significant that this plan has resulted in a very high percentage of new and modern equipment having been installed in this plant. In fact, as shops go, the percentage is very high. Savings estimated on new equipment are always checked when machines are installed. The effectiveness of this whole plan is well illustrated by a recent experience with new milling machines. When the proposal to include this equipment in the budget was made, estimated savings were placed between 25 and 30 per cent. Some months later, after careful study and selection, millers were installed that actually saved 75 per cent of their cost in a year's time.

How can a shop keep abreast of the many new offerings by machine tool builders? By making intelli-

(CONTINUED ON PAGE 202)

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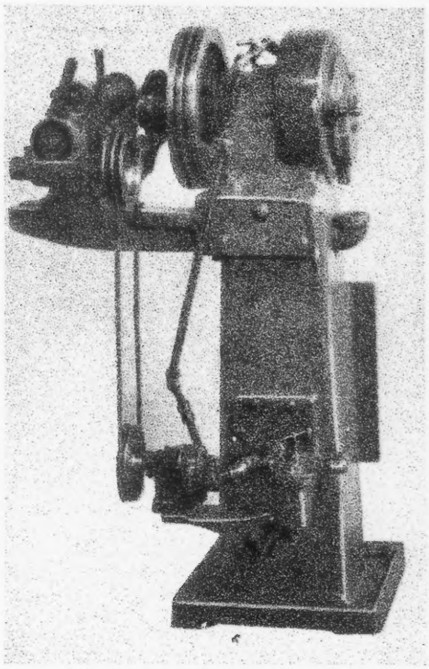
AT RIGHT

LANGELIER Wire Swaging Machines, for swaging the tungsten wire used in electric light bulbs is built in three sizes for swaging either hot or cold. A heating furnace can be attached to the front cover of the machine. (Langelier Mfg. Co.)



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WEIGHING more than 200 tons this new 12,000-lb. capacity steam-drop hammer is unusually heavy. Frame base is extended along the sides to prevent twisting. The cylinder is of a nickel-molybdenum alloy and, with the new type of balanced slide valve, gives correct speed at moment of impact with a quick pick-up after the blow. Savings in steam and air are emphasized. (Chambersburg Engineering Co.)

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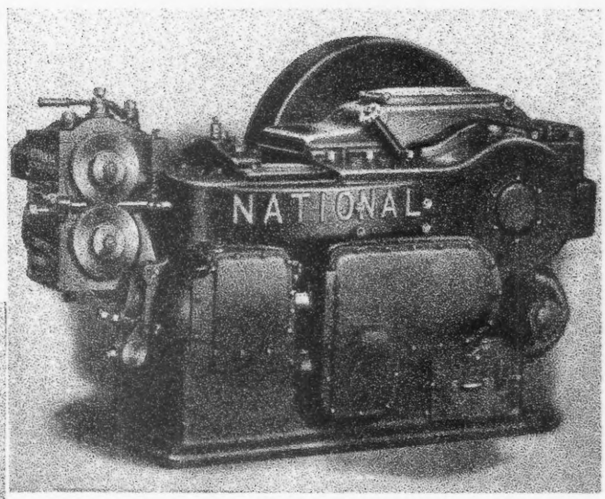
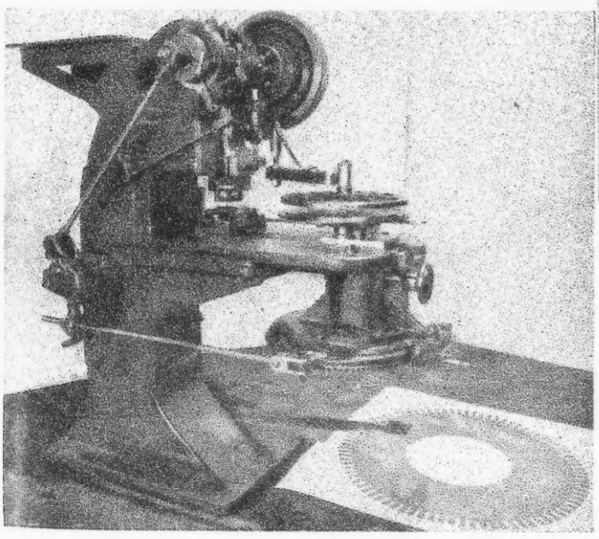


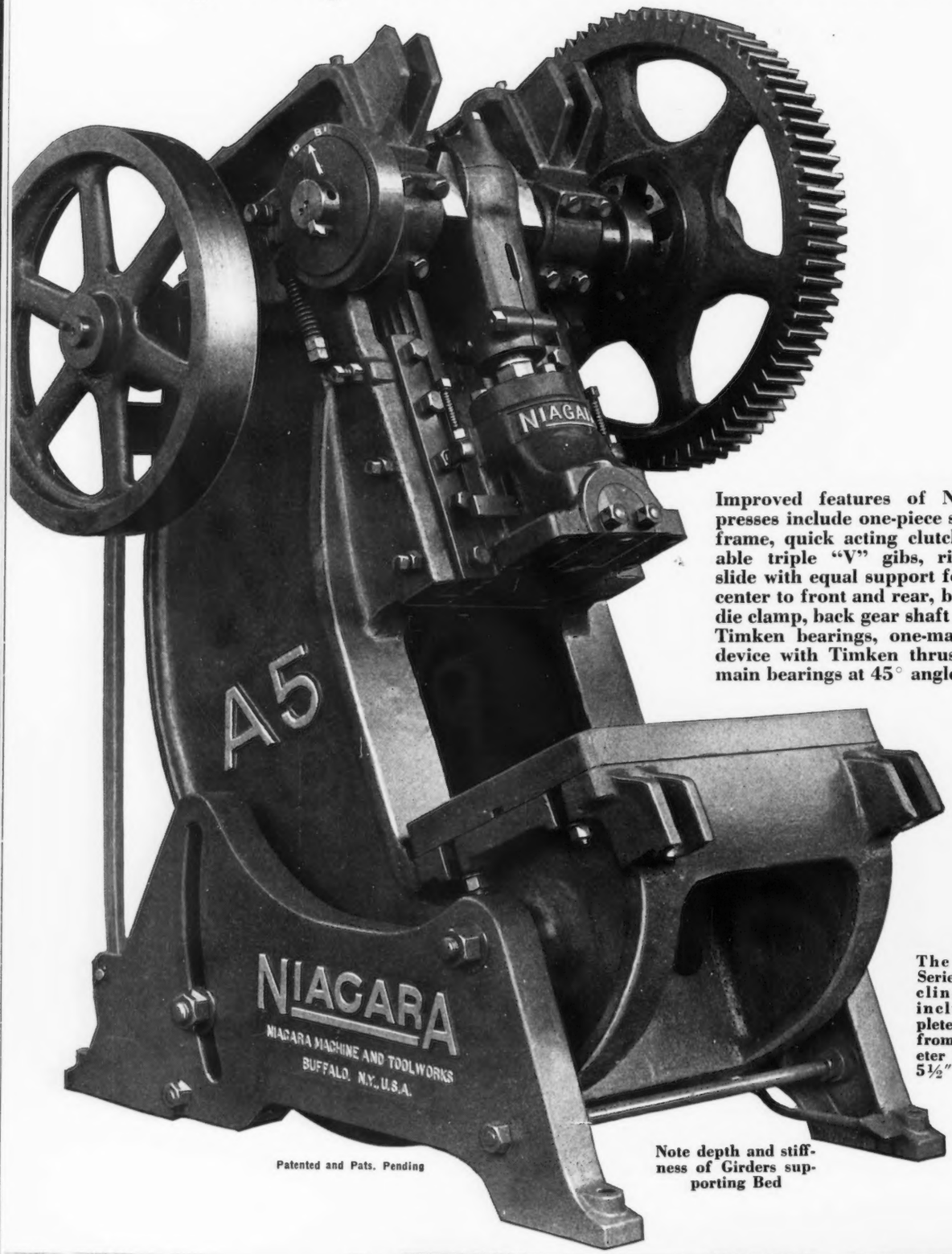
ONE of complete line of open-die cold heading machines that may be operated either as relieving-grip or solid-die machines, providing unusual flexibility in kind and range of work handled. Long or short open or solid die work is produced with equal facility. All work can be extruded simultaneously with the heading operation to prepare it for threading. (National Machinery Co.)



AT LEFT

HIGH-SPEED Notching Press with rotary friction driven index attachment for notching motor laminations at rate of 400 and 650 notches per minute. (V & O Press Co.)

Why Experienced Production Men



Improved features of Niagara A-5 presses include one-piece steel casting frame, quick acting clutches, removable triple "V" gibs, rigid, strong slide with equal support for die from center to front and rear, breech block die clamp, back gear shaft running on Timken bearings, one-man inclining device with Timken thrust bearings, main bearings at 45° angle.

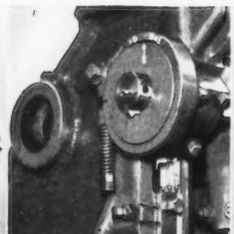
The Master "A" Series line of inclinable presses includes a complete line of sizes from 1¼" diameter shaft up to 5½" diameter.

Patented and Pats. Pending

Note depth and stiffness of Girders supporting Bed

Slide gives equal die support center to front and rear

Back shaft assembly equipped with Timken bearings



Integral back gear support and compensating brake

Steel casting frame and one-man inclining device

6-point engagement clutch. Main bearings split at 45° angle

STRENGTH
RIGIDITY
DRIVE ENERGY
ACCURACY
LONG DIE LIFE
LOW MAINTENANCE COST

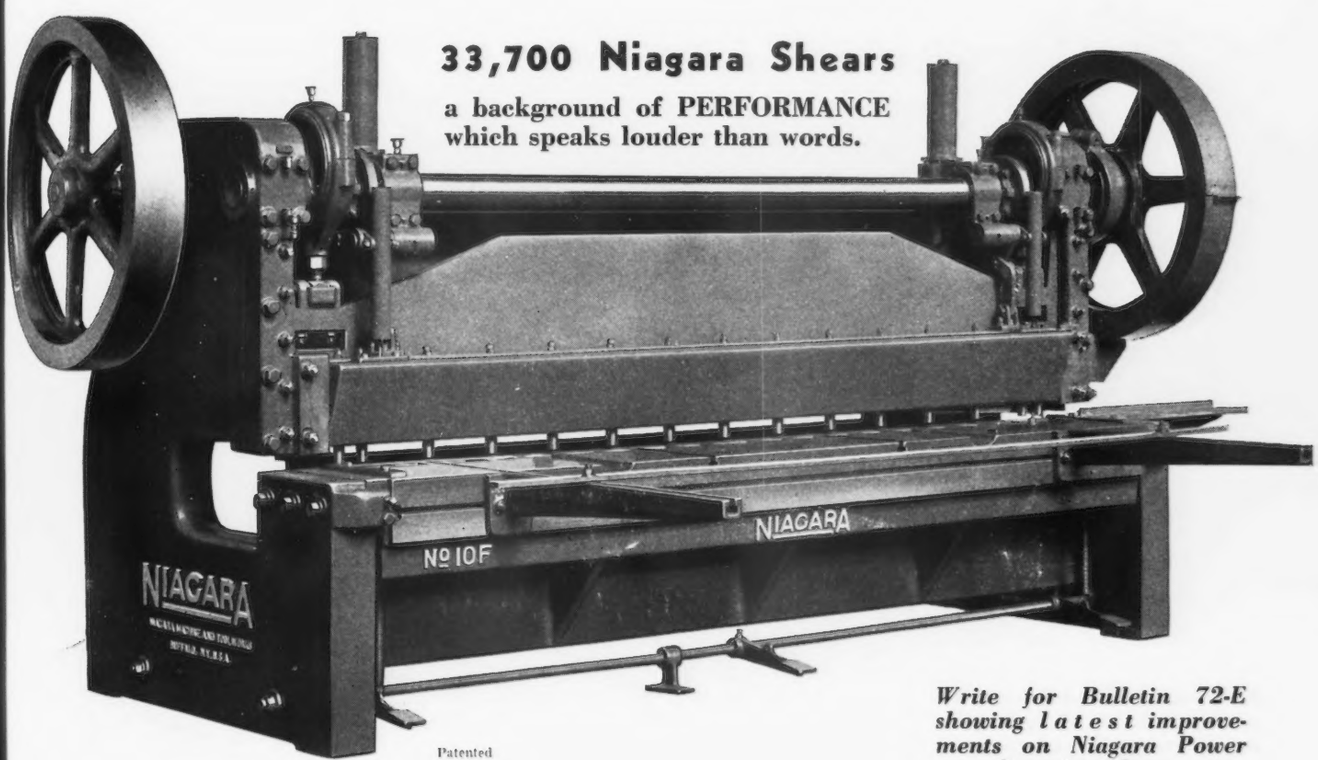
DEPEND ON NIAGARA PRESSES AND SHEARS

to Increase Production and Reduce Operating and Maintenance Costs

Engineering research and development have been continuous processes at Niagara for fifty-six years. It is an unbroken record of accomplishment under one continuous management—that of its founders and their successors trained in this business.

Improvements are practical and real because the impractical and unworkable have already been rejected.

Niagara engineering talent as well as Niagara plant facilities assure building in accordance with the best modern practice . . . in up-to-date engineering design . . . in controlled analysis of materials to provide strength and rigidity . . . in specialized manufacturing methods . . . in producing a complete line of presses and shears to supply the most economical size and type of machine to fit exacting production requirements.



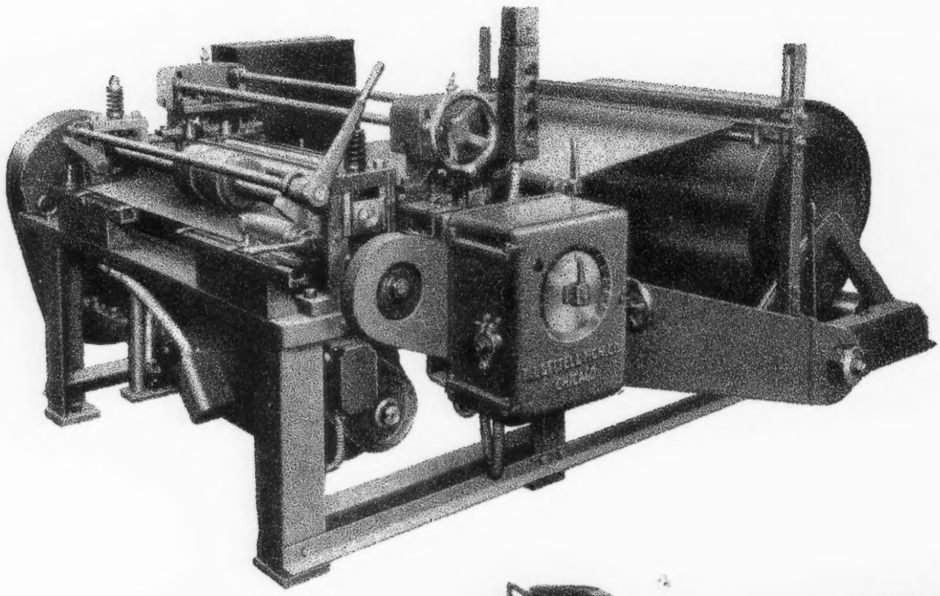
33,700 Niagara Shears
a background of PERFORMANCE which speaks louder than words.

Patented

Write for Bulletin 72-E showing latest improvements on Niagara Power Squaring Shears.

NIAGARA

NIAGARA MACHINE AND TOOL WORKS, BUFFALO, N. Y.
NEW YORK . . . DETROIT



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AT LEFT

LITTELL Feeding and Straightening Machine is designed for feeding coiled stock for auto bodies and fenders into a blanking press. The machine illustrated is capable of handling coils weighing up to 5000 lb. of stock up to 0.040 in. thick and 48 in. wide. A larger machine is also manufactured. (F. J. Littell Machine Co.)

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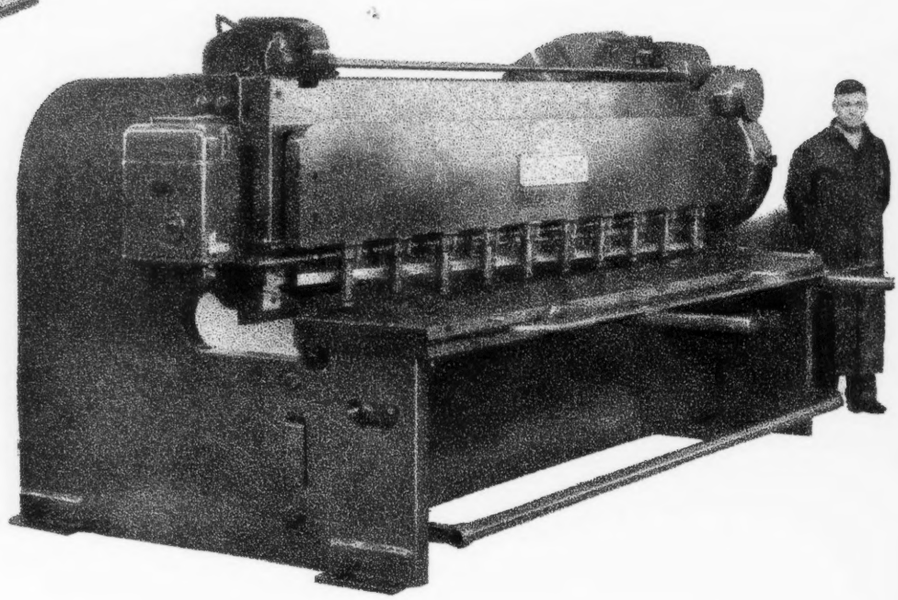

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AT RIGHT

CINCINNATI All Steel Shear is illustrated. It is a high-speed squaring and slitting shear with capacity of 3/16 in. by 96 in. A tilted upper knife bar has been added for extreme accuracy, the table is provided with stainless steel scales, there is automatic gaging front and rear and a light beam gage for shearing to scribed line. (Cincinnati Shaper Co.)

o o o

(CONTINUED FROM PAGE 198)

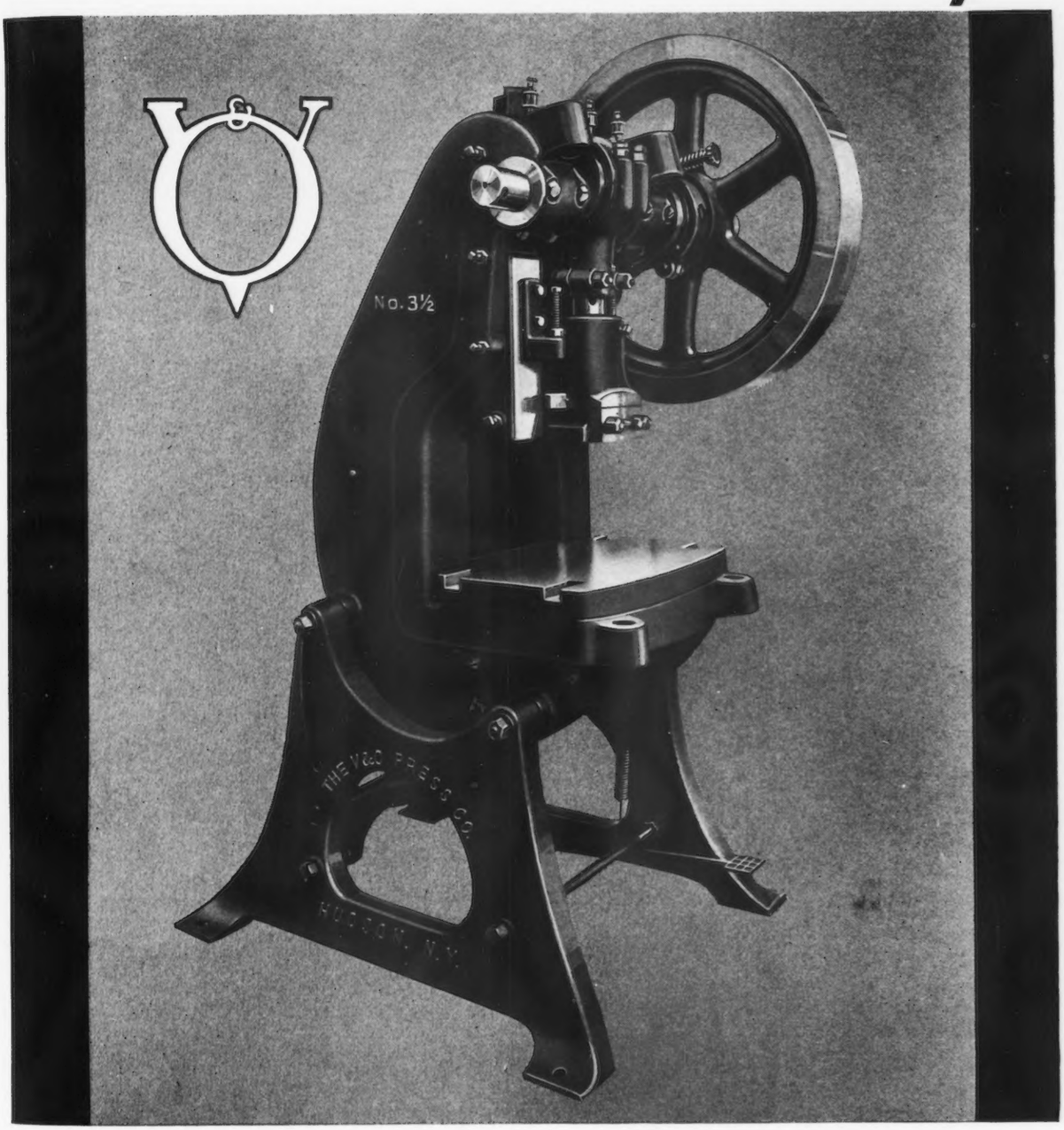
gent use of printed matter and advertising put out by the builders. The Union Special Machine Co. sends all such matter to the superintendent's office where it is actually studied. If there is only remote possibility of its having future application it is filed, under department headings, adjacent to the shop equipment record. When it comes time for recommendation of a purchase this printed matter is taken from the files and closely reviewed in connection with the problem at hand. In this way there is practically no possibility of skimming over only part of the field of offerings. This practice also tends to eliminate the factor of prejudice and opens a broader field for selection.

This plan has worked so effectively in avoiding production blockades, in keeping all concerned thoroughly familiar at all times with the condition of the shop equipment and as a means of having the money available when purchases are required that the sales department has been quick to adopt it to its own use. The necessary forms are furnished at small cost to the sewing machine user by the Union Special Machine Co.

This method consists of a machine record file composed of an individual record of each machine. It is kept on 5 in. by 8 in. cards which have spaces for the inventory symbol, maker's name,

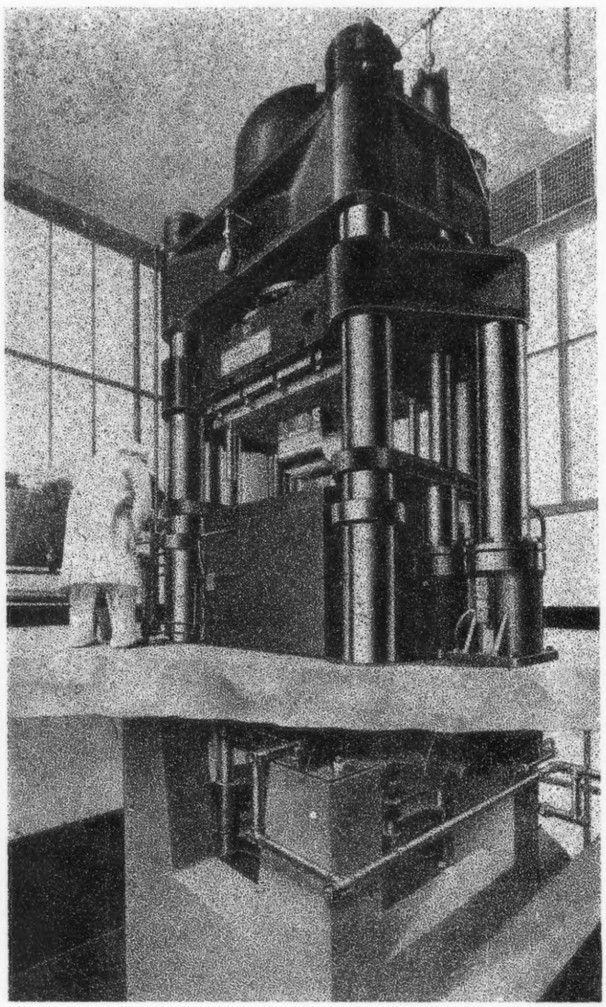
(CONTINUED ON PAGE 204)

Versatility



★ It is difficult to over-emphasize how adaptable this No. 3½ V & O Press is to a wide range of operations. ★ At the Machine Tool Show in Cleveland this Inclinable Press will be in operation equipped with double roll feed, scrap cutter, stock reel, and a progressive-step set of dies producing ash trays. ★ Visit us at Booth E-315, see this press in operation, and receive a souvenir tray.

THE V & O PRESS COMPANY, HUDSON, N. Y.



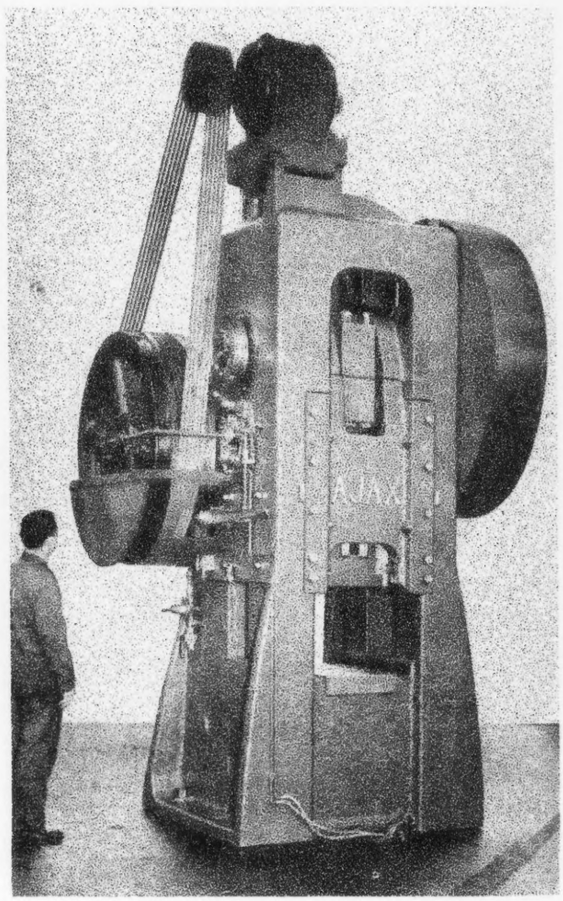
ABOVE

WIDER and more diverse utilization of molded plastic products is foreseen in the development of this giant hydraulic press, recently installed by the General Electric Co. Believed to be the largest of its kind, the machine weighs 44½ tons and is equipped with nine cylinders operating at pressures of 1500 and 3000 lb. per square inch. The main ram is capable of traveling at 100 in. per minute. (French Oil Machinery Co.)

o o o

BELOW

SOLID One-Piece Steel Cast-Frame Forging Press for rapid and accurate hot forging and precise hot or cold coining. Adjustability of air clutch pressure to meet requirements protects equipment, and air valve tripping by either hand or foot provides convenient and quick action. (Ajax Mfg. Co.)



(CONTINUED FROM PAGE 202)

maker's symbol, type of needles used, serial number of the machine, and date of purchase. Columns are also provided for dates of repairs, mechanic's clock number, labor costs, cost of parts, total cost, service days, and any remarks that might be necessary. These cards are filed according to serial numbers, inventory symbol, or to suit the individual preference.

Machine equipment record Form 374 provides a detailed comparison between the style of machines in use and the corresponding machines in the latest and most improved styles. This card takes into account the following factors:

The rate of production for old and new style machines.

The cost of operating labor for old and new machines.

The cost of floor space.

The cost of maintenance for old and new machines.

The cost of power.

The cost of thread for old and new units.

The investment required for new units.

The cost (if any) for repairing or overhauling old machines.

The Union Special Machine Co. offers the following suggestions to the user. One card is filled in for

(CONTINUED ON PAGE 206)

AJAX

Air Clutch Operated

FORGING MACHINE

AND

AJAX-HOGUE WIRE DRAWER

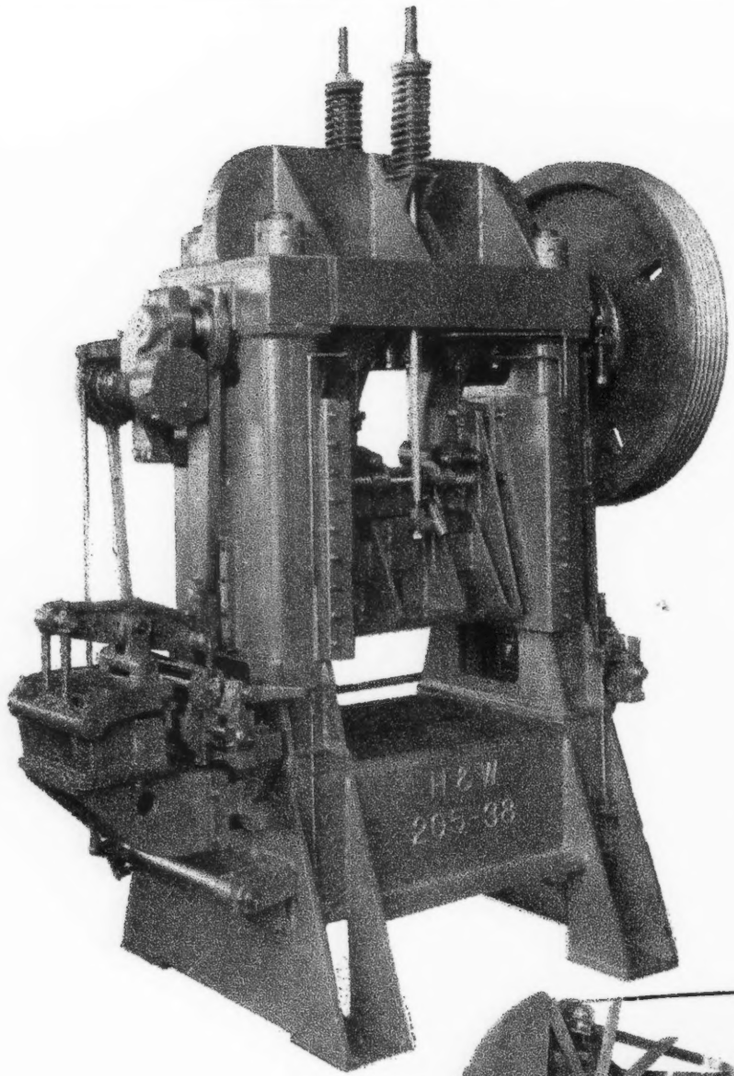
WILL BE ON DISPLAY

IN BOOTH "F" AT THE

MACHINE TOOL SHOW

We wish to extend an invitation to those interested to visit our modern plant at Euclid, Ohio

THE AJAX MANUFACTURING COMPANY
EUCLID BRANCH P. O. CLEVELAND
CHICAGO OFFICE: 621 MARQUETTE BLDG.



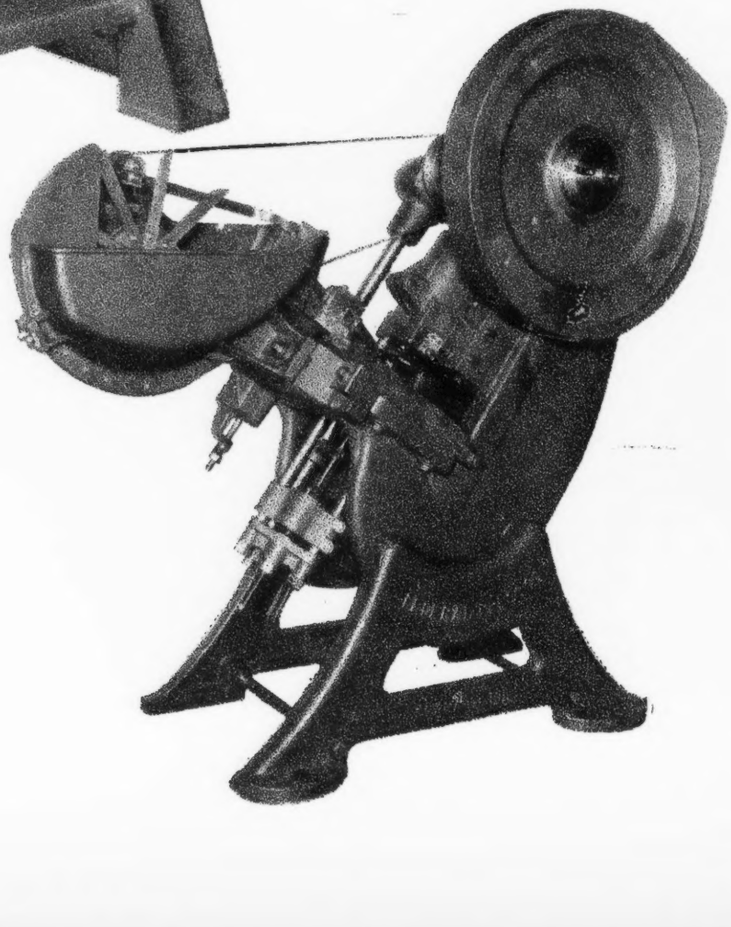
AT LEFT

AUTOMATIC-FEED, Double-Crank, Straight-Sided, Tie Rod Press, with frame members and slide fabricated of welded steel, normalized and annealed. Intricate stampings can be produced from progressive dies with press operated at high speed. (Henry & Wright Mfg. Co.)

o o o

BELOW

HIGH speeds are attained in this automatic for trimming cap screws, bolts, etc., and for extruding operations. Blanks from 1/2 to 2 1/2 in. long, 3/8 in. and smaller in diameter are handled at rate of 140 per minute. The hopper, of paddle-wheel type, is adjustable for the work. (Federal Press Co.)



(CONTINUED FROM PAGE 204)

each sewing operation regardless of the number of machines used unless the machines are of several different types. In this event it is necessary to fill in a card for each particular type used on the operation in question.

Then fill in the blanks that have been checked on the face of the sample form. Then turn the form over, and in the space provided for "Remarks" and opposite Item B, write in the average daily wage of the operators engaged on the particular operation considered and

(CONTINUED ON PAGE 210)

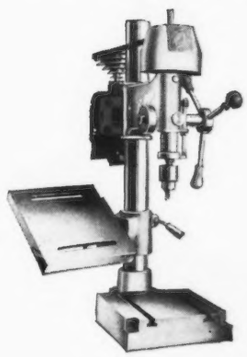
"Buffalo" Comes to Cleveland

—with the finest selection of tools we've offered in fifty-seven years in business!

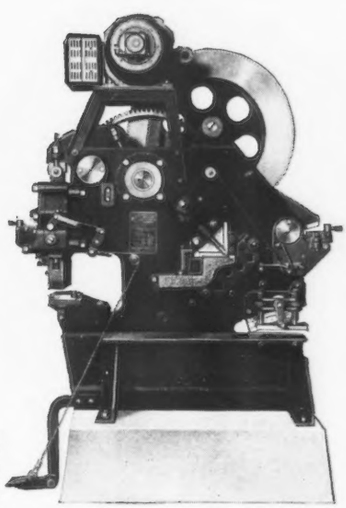
—several new drills—produced to do two things—operate accurately—and economically!

—new features on every metal cutting and bending tool.

—new, simplified operating mechanism to speed work by unskilled labor.



Popular from Alaska to Africa—the new 5-speed, No. 15 Drill (bench and floor types) introduced a few months ago, and the largest selling drill in the Buffalo line. Operate it at Space 111!



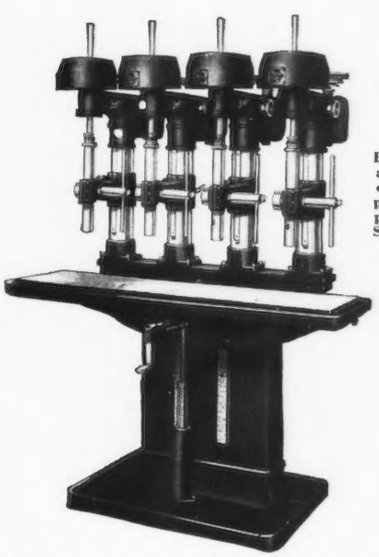
Hundreds in use in large and small shops—wherever metal is cut and punched, Buffalo Universal Iron Workers now have several "1935" features.

In short—we're showing fourteen machines that every shop man will enjoy seeing in operation.

Remember our Space 111, New North Annex.

We'll see you at Cleveland.

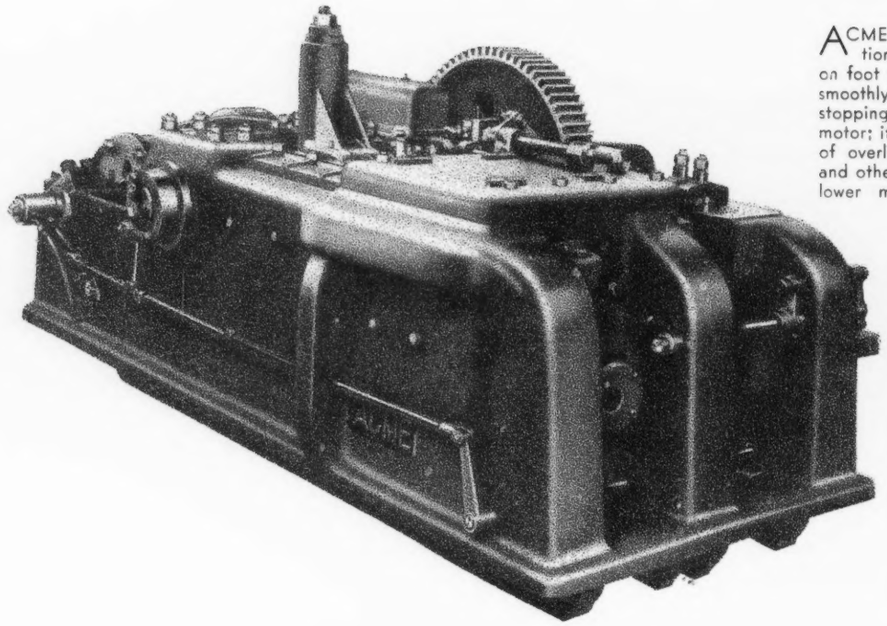
Buffalo Forge Co.
492 Broadway, Buffalo, N. Y.



Buffalo Multispindle Drills are accurate and substantial without being excessively high in price. Operate them—get prices—and be surprised! Space 111.

Bending rolls save enormously in shops where arcs or circles are frequently required. Patented design offers operating features found in no other machine. Three models demonstrated at Space 111.

You'll PROFIT *by a* Visit to Space 111

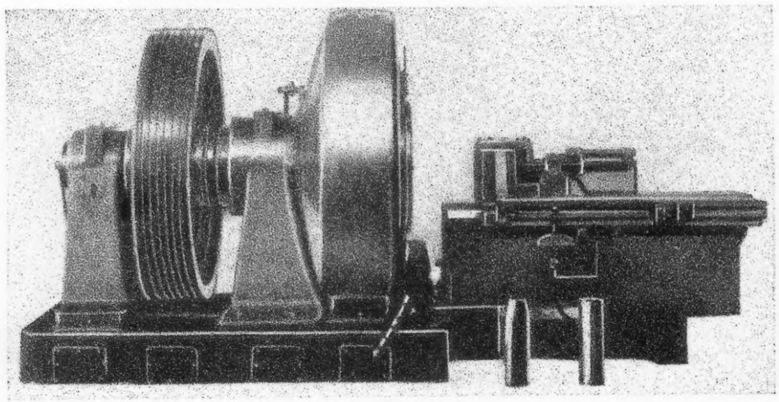


AT LEFT

ACME All-Steel Forging Machine with friction cushioned drive. Slight pressure on foot treadle starts machine instantly and smoothly. The clutch cushions starting and stopping, eliminating shock to machine and motor; it also cushions flywheel shock in case of overload, relieving strain on crankshaft and other parts. Better forgings, as well as lower maintenance, is claimed. (Acme Machinery Co.)

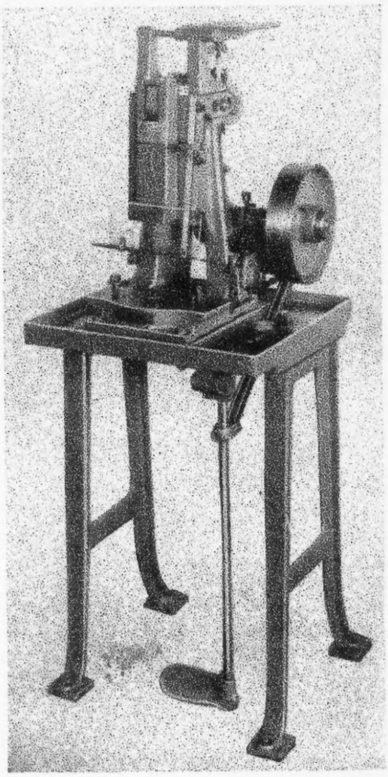
BELOW AT LEFT

LANGELIER No. L Swaging Machine is the largest of its type ever constructed, in size as well as capacity. It is capable of tapering or finishing work up to 6 in. diameter. The machine illustrated is for swaging shells. (Langelier Mfg. Co.)



BELOW

BENCH Press designed to perform by power many operations done by foot presses, eliminating fatigue and thus affecting production. A fool-proof safety device enables operator to use both hands freely. (Waterbury Farrel Foundry & Machine Co.)



(CONTINUED FROM PAGE 206)

the average daily production obtained per operator. These figures can be easily determined from plant payroll and production records. Proceed down to Item F and write down the average yearly maintenance and repair cost per machine in the "Remarks" column, being sure to include an estimate of the labor required as well as the cost of the parts.

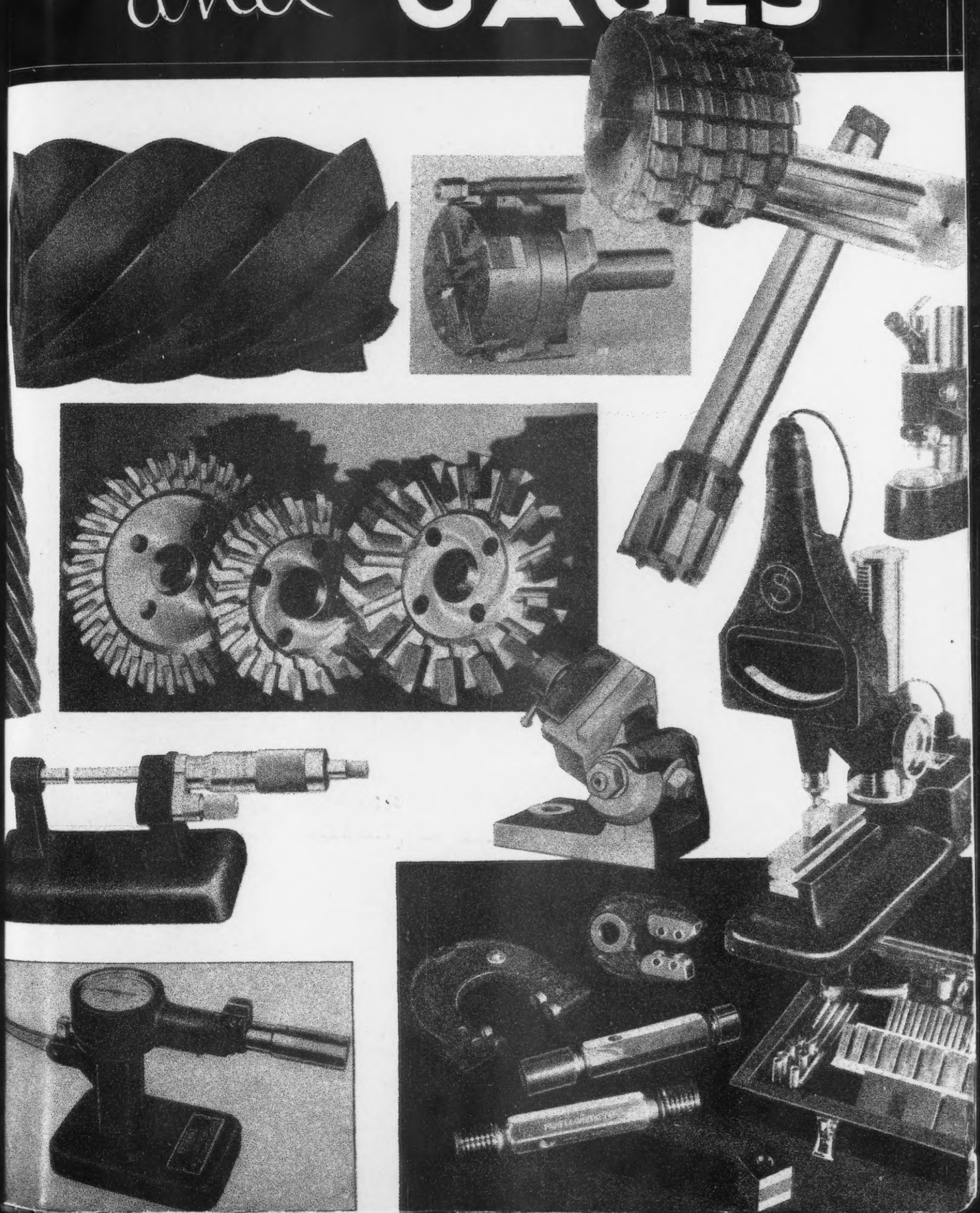
To fill in the remaining blanks demands an intimate knowledge of all the new styles of machines available, together with full and complete data on their production, operating costs, and so on. The Union Special Machine Co. will assist in this phase of the work without obligation and suggests adoption of one of the following courses of action:

(1) Present the prepared forms in accordance with the above suggestions to the Union Special salesman on the occasion of his next visit to the plant. Ask him to recommend the latest and most modern equipment for doing the job in question and have him give the following data:

Per cent efficiency of present equipment compared to the new type recommended.

(CONTINUED ON PAGE 214)

SMALL TOOLS *and* GAGES



In SMALL TOOLS

A controlled science

Sales Offices and Stock at: BIRMINGHAM BOSTON CHICAGO CINCINNATI CLEVELAND DETROIT

PRATT & WHITNEY COMPANY

it's METALLURGY

Steel treating, with us, is a matter of facts and knowledge. Nothing is left to guesswork. Laboratory research has pointed out the hardening specifications for every tool, and each individual treatment is carried out to the degree and the second by automatic temperature controls and electrical timing. Accurate electric heat hardens and draws the steel. Is it any wonder that Pratt & Whitney tools are *uniformly* hard and tough?

Take a sample order of a dozen taps, for instance. The blanks are made from a particular carbon, alloy, or high speed tool steel fitted for the job—steel that has passed P&W laboratory analysis before it can even reach our storage racks. Metallurgical experts make out a heat treating record card specifying the temperature and time for both hardening and drawing. The blanks go to a modern, fully equipped hardening room, where every detail is under close supervision. Automatic controls wherever possible, daily checking of pyrometers, electric timing, the skill of expert operators—all are kept at highest efficiency to produce those tools to specifications.

These taps must be of the definite hardness that long experience has proved is best. That is why they are inspected for both Rockwell hardness and file hardness. The results must check against the specified record. And, should another order of those same taps be wanted, the records are on file and can be duplicated.

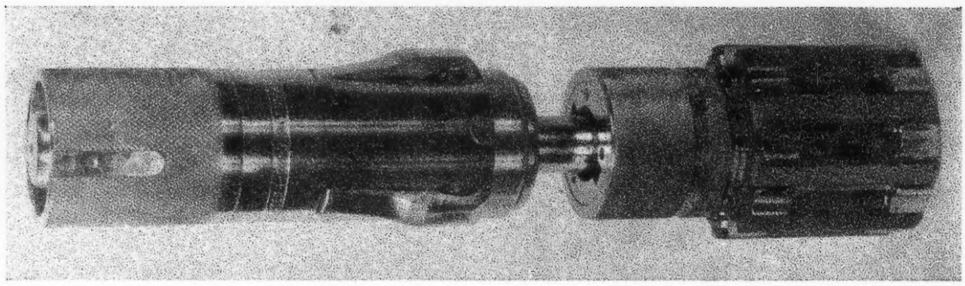
These are some of the reasons why Pratt & Whitney tools are tough and good. Mechanics the world over know and like them. When next you are buying small tools, remember that proper steel, controlled heat treatment, and efficient design are requisites of all good tools, and of every one made by Pratt & Whitney.

Let us send you a copy of our new catalog, Number 14. In it is much valuable data that shop men need and use almost daily.

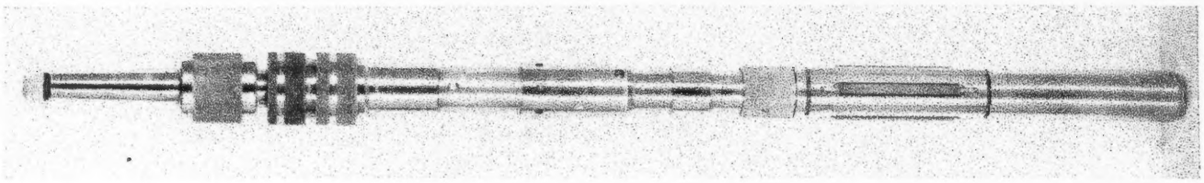
at Pratt & Whitney

LOS ANGELES NEW YORK PHILADELPHIA PITTSBURGH
ROCHESTER SAN FRANCISCO ST. LOUIS

HARTFORD, CONNECTICUT

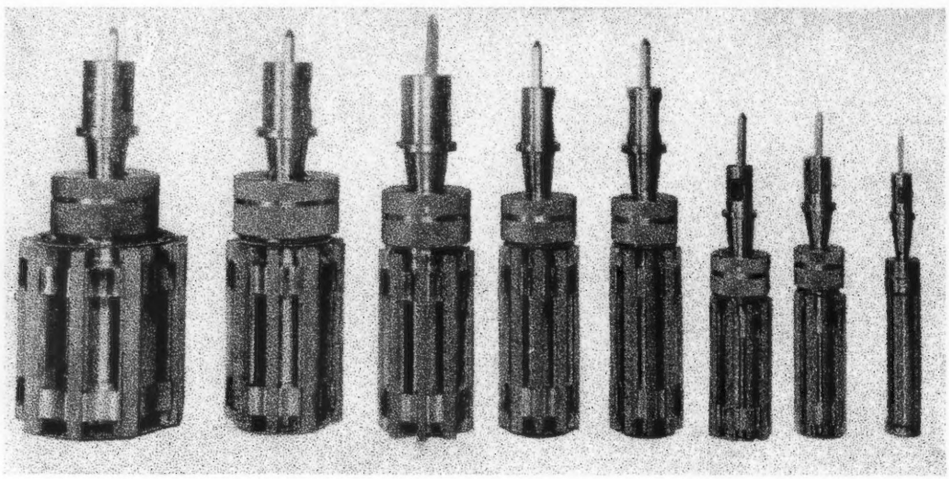


HUTTO High Production Cylinder Finishing Hone is especially designed for finishing, on a production basis, cylinders which have been diamond bored or fine-bored otherwise. A new adjustment has been provided on finishing hones for expanding the fiber guides separately.



BELOW

HUTTO Model RA High-Production Connecting Rod Hone is for rod and similar short bores which may be alined by the use of suitable fixtures. Design permits simultaneous honing of several bores at a time in a floating-type fixture. Also has new independent fiber guide adjustment. (Carborundum Co., Hutto Division.)



ABOVE

HUTTO Manually Controlled Cylinder Finishing Hones are designed for honing cylinders of extreme length. Similar in construction to the high production type hones but expansion and contraction of abrasive stones is accomplished manually. (Carborundum Co., Hutto Division.)

o o o

(CONTINUED FROM PAGE 210)

Estimated cost of repairing, changing over or overhauling present equipment so as to put it in first class operating condition.

Probable per cent increase in production to be obtained with the new equipment. This is not merely an estimate, but is based on actual performance studies conducted in plants doing similar work.

Estimated maintenance on recommended equipment.

Cost of the recommended machine.

Actual trade-in value or estimated resale value of present equipment.

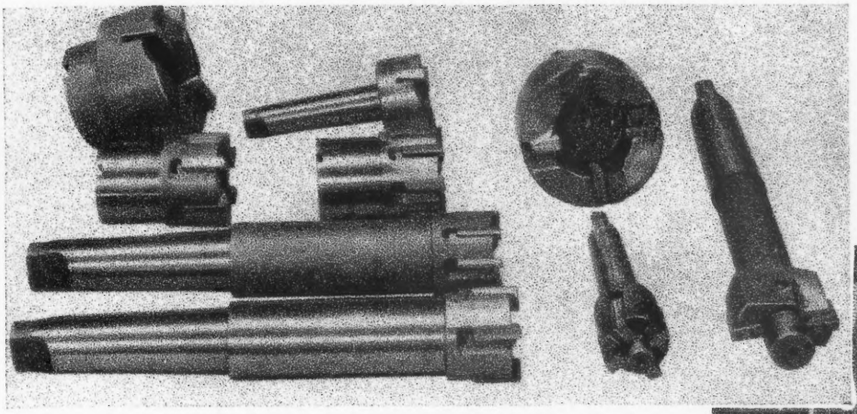
(2) Send the completed forms to the sales engineering department, Union Special Machine Co. It will recommend the proper machine, supply the required data and return the forms completely filled in.

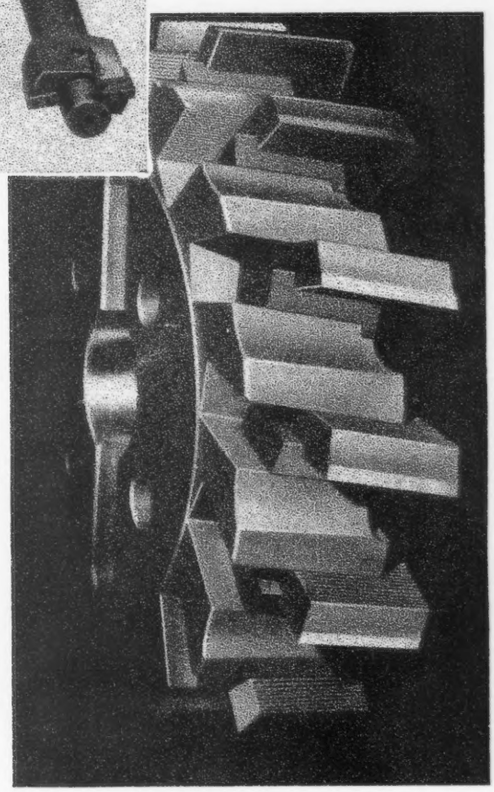
The argument may be advanced by machine tool builders that many shops are not in position to make and record adequate data. That is probably true if they are not given the right encouragement and assistance. The Union Special Machine Co. has had as serious, if not a more serious, handicap in this respect than have machine manufacturers in other lines. Certainly the level of intelligence in the average sewing room is not above that in the average machine shop.

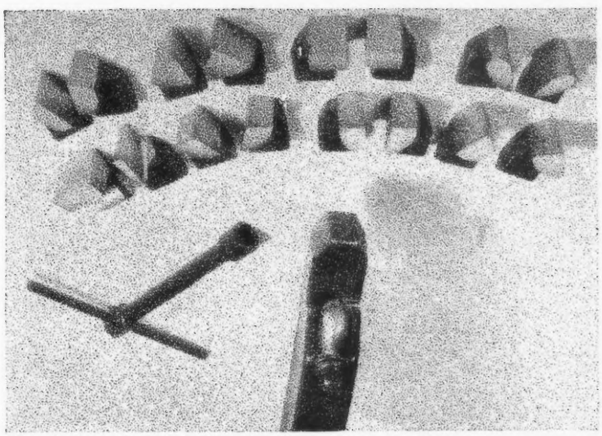
In any event, the Union Special Machine Co. put the plan into use in its own shop and is now extending it to the shops of its customers by offering all reasonable assistance. The practice is paying dividends and it is contributing its part to the revival of the capital goods industry.

AT LEFT AND BELOW

INGERSOLL Zee Lock Milling Cutters employ zee shaped wedges to retain the inserted cutters, making it impossible for blades to shift under cut. Blades are adjustable to compensate for wear. Principle is now applied to a variety of inserted tooth tools. (Ingersoll Milling Machine Co.)







O. K. Improved Lathe Planer and Shaper Tools embody a new bit adjustment based upon a system of mating serrations. Design is said to eliminate all tipping of the tool bit. Holders are of drop forged chrome nickel alloy and bits of correctly heat-treated high-speed steel. (O.K. Tool Co.)

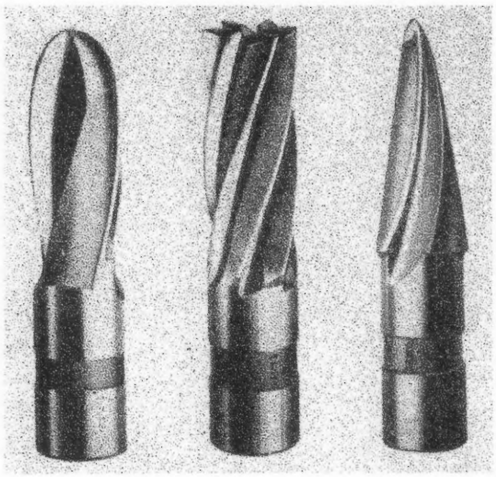
Machine Tools of the Present and the Future

(CONTINUED FROM PAGE 54)

ard and specialized machines is, perhaps, the greatest spur to further developments of machine tools and also the greatest stumbling block. Before there was any mass production, specialized machines were made only when the standard machinery was not capable of doing the job. When guns began to be made in quantity, machines were developed capable of doing various operations better or swifter than existing standard machines. There was, for instance, the Lincoln type miller, and the gun-barrel drilling machine. Standard machines could have done the work, but these specialized machines could do the work more profitably. Since then many specialized machines have been designed. This development has proceeded along two distinct lines. Certain industries have developed machine tools especially adapted to produce pieces or perform operations peculiar to that industry. Such machines are not only specialized, they are *special*. The second line was of more general interest. This development was along the line of reducing the general usefulness, but increasing very largely the usefulness for some specific purpose. An example of this kind is the gear cutter, which is less generally useful for milling or for slotting, but much more so if this milling or slotting is to be done on gears. Another example is the turret lathe. It sacrifices length, but gains by the use of a multitude of tools.

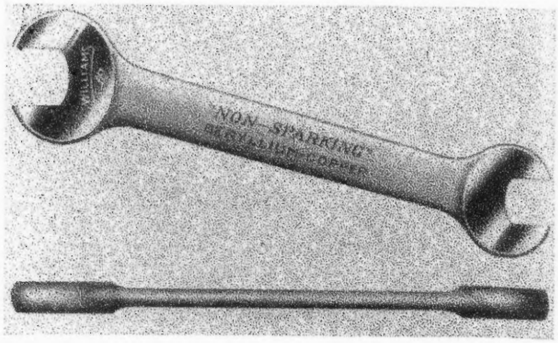
In general, it may be said that most developments were along the line of limiting the range of usefulness, and here the industry as well as the user of the machine tool was confronted with a very difficult problem. One can go to any imaginable extent with this specialization, but one would come to a point

SMALL TOOLS AND GAGES



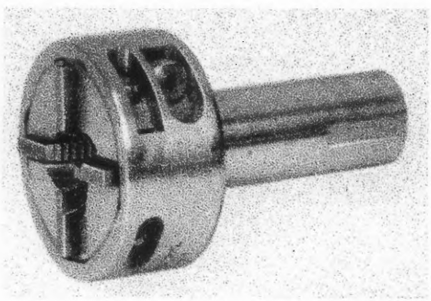
ABOVE, LEFT

PRATT & WHITNEY New Die-Sinking Cutters have been produced for high-speed use. They are known as ball end, square end and 7 deg. taper cutters, each available in a range of sizes. Designed to operate at high spindle speeds in tough die steel and primarily for use in P & W die-sinker. (Pratt & Whitney Co.)



ABOVE, RIGHT

WILLIAMS Non-Sparking Safety Wrenches are drop forged from beryllium - copper and heat treated. Especially adapted for use where fire hazards exist. Available in single and double head types in a large range of sizes. (J. H. Williams & Co.)

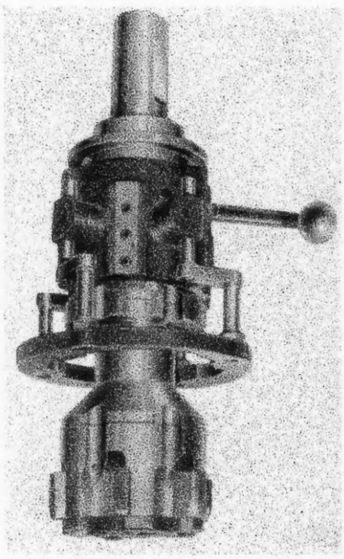


AT LEFT

EASTERN Machine Screw Solid Adjustable Die Heads are designed so that they weigh only about one-quarter as much as a self-opening head of similar capacity. Made in four sizes. (Eastern Machine Screw Corpn.)

BELOW, LEFT

WILLIAMS Agrippa Threading Tool Holder is designed with a formed cutter requiring grinding only on top edge. Made in two sizes, No. 150 and No. 151. (J. H. Williams & Co.)



LANDIS Collapsible Tap with Extension Link is designed to permit tapping of threads of greater length than possible with standard taps. Several heads of different sizes can be used on the same body. Any length of link, to suit any length of thread, can be provided. (Landis Machine Co.)

where so few of one kind of machines are needed that it would not pay the manufacturer to make them, and they would be so specialized that the least change in the product would make them obsolete, so that it would not pay the user to buy them.

However, we have not reached that point with the machine tools as they are now made by the industry. A number of such machines of very limited range of usefulness exist, and are still being made, but they are specials, made as such, used as such, and accounted for as such.

A 12 ft. planer would take care of practically any size of work appearing in almost any shop, but it would be foolish to confine oneself to that size if almost all of the work is of much smaller size. One uses an assortment of planers, and if the 12 ft. jobs are met only once in a long while, one farms them out. To a certain extent the same is done with other machines, but not always. There is still a surplus of range in most machine tools when they are used for mass production. No distinct line has, as yet, been drawn between machines for jobbing work, for small quantity production, and for mass production.

As early as 1907 the author designed a standard machine tool on the unit plan, or, as it is now called, on the *building-block* principle. The design made it possible to build a great variety of sizes and for a great variety of requirements out of a relatively small number of

(CONTINUED ON PAGE 220)

See CARBOLOY* ACTION at the MACHINE TOOL SHOW CLEVELAND, SEPT. 11—21

HIGHER SPEEDS!

GREATER ACCURACY!

LONGER TOOL LIFE!

BETTER FINISH!

SAVING IN METAL!

LOWER COSTS!

Many OF THE LEADING MACHINE TOOL BUILDERS will demonstrate

THE NEW, HIGHER ORDER OF ECONOMY, SPEED AND EFFICIENCY YOU CAN OBTAIN FROM MODERN MACHINES EQUIPPED WITH **CARBOLOY** CEMENTED CARBIDE TOOLS.

FOR A COMPLETE LIST OF **DEMONSTRATIONS** visit **CARBOLOY** BOOTH E-206

CARBOLOY COMPANY, INC.
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CARBOLOY*

REG. U.S. PAT. OFF.

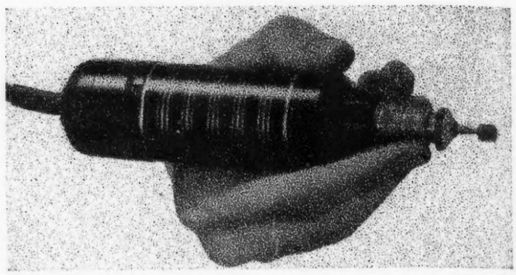
CEMENTED CARBIDE

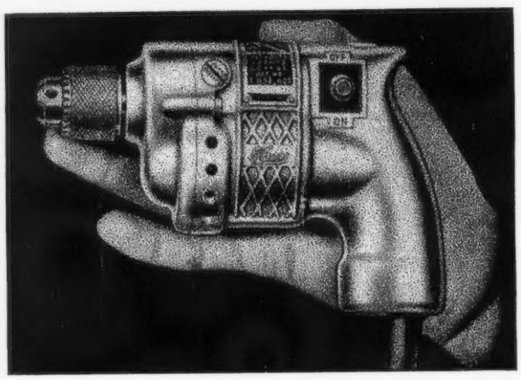
ABOVE

SKILSAW Hand Grinder has been produced in new design with Bakelite body, reducing the weight of the tool to 3 lb. Built for continuous as well as intermittent duty and air-cooled. (Skilsaw, Inc.)

AT RIGHT

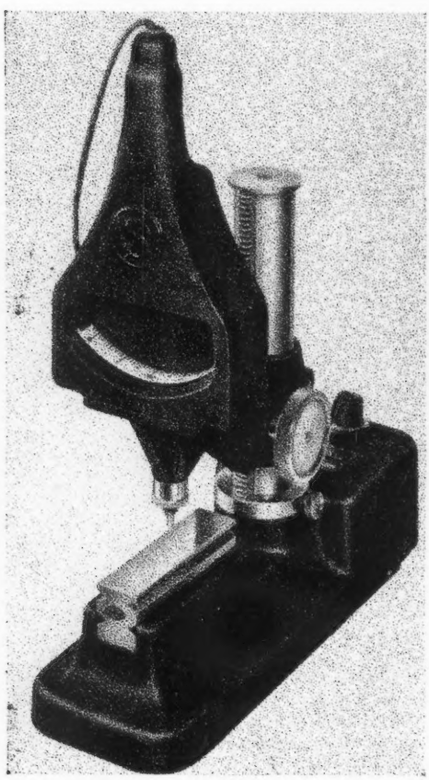
CHICAGO Wheel & Mfg. Co. De Luxe Hand-ee Grinder is a new design of hand grinder weighing 12 oz. with a speed of 25,000 r.p.m. Due to its light weight it can be manipulated like a lead pencil. (Chicago Wheel & Mfg. Co.)

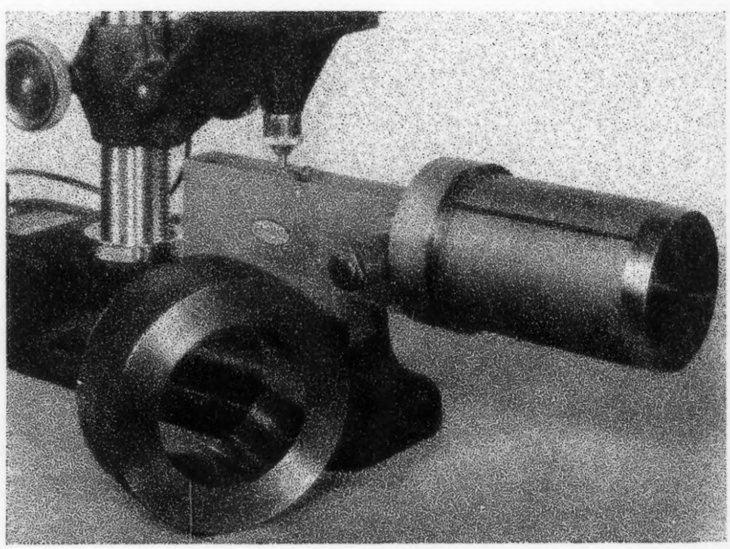




AT LEFT

THOR 2½-lb. Electric Portable Drill is said to be the lightest weight tool of its type ever built. It has a free speed of 2500 r.p.m. and capacity up to ¼ - in. drill. Air-cooled. (Independent Pneumatic Tool Co.)





ABOVE AND AT LEFT

SHEFFIELD No. 3 Visual Gage with Internal Attachment is an electrical gage built in five models with magnifications ranging from 2000 to 1 to 10,000 to 1. Both external and internal diameters are readily measured without fundamental changes in gage assembly. Amplification by the Reed principle is utilized. (Sheffield Gage Corpn.)

★ No matter how you come to the Machine Tool Show—from roller skates to airplanes—we invite you to visit our booth and let us show you the latest in twist drills, reamers and other small cutting tools. We think we shall have some interesting things to show you.

When you arrive at Cleveland Public Auditorium, all you have to do is to walk straight along the Arena Floor to

BOOTH E-306

where we shall be glad to meet you. Just look for the revolving drills.

The CLEVELAND TWIST DRILL COMPANY
1242 EAST 49th STREET
CLEVELAND

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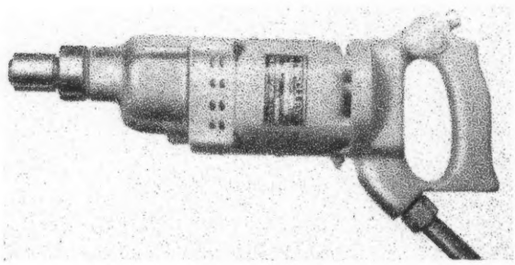
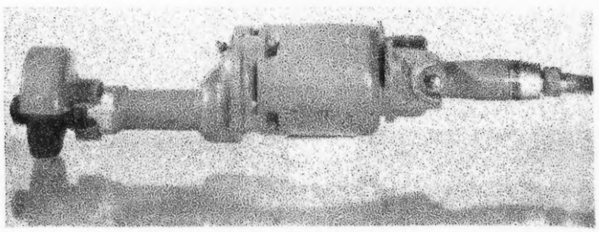
6515 SECOND BLVD. DETROIT · LONDON - E. P. BARRUS, LTD. - 35-36-37 UPPER THAMES ST., E.C.4

TRADE MARK REG. U.S. PAT. OFF.

SMALL TOOLS AND GAGES



HERCULES No. 21-S Screw Driver is a new light-weight, high-frequency electric tool for use in screw driving in auto body plants and on similar work. Three speeds and capacity for No. 12 and No. 14 screws. (Buckeye Tool Co.)

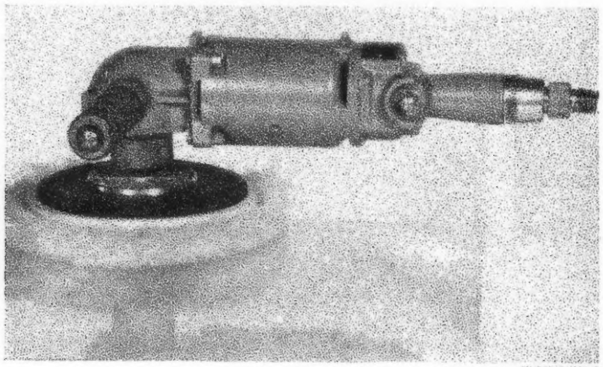


ABOVE

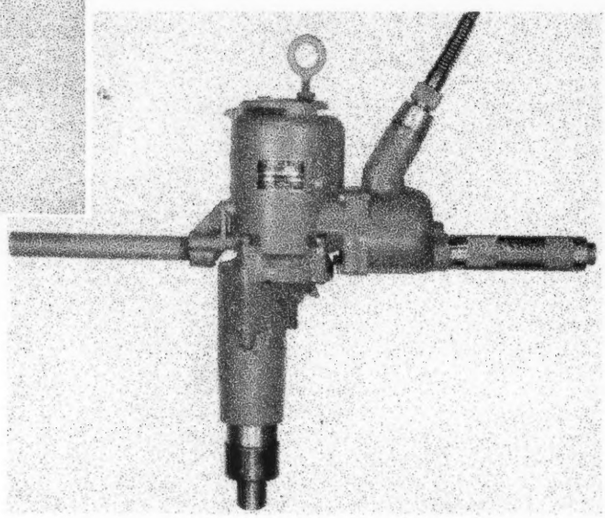
HERCULES No. 37-1800 High-Frequency Electric Polisher is designed for final touch-up on auto bodies and fenders before car leaves assembly line. Weighs 10 lb. and is speeded to 1800 r.p.m. (Buckeye Tool Co.)

BELOW

HERCULES No. 60-N Nut Runner is a heavy-duty, high-frequency nut runner for engine assembly and similar work. Has shockless clutch preventing fatigue to operator. Three speeds and capacity from 1/2 to 5/8-in. nuts. (Buckeye Tool Co.)



HERCULES No. 51-5400 High-Frequency Grinder is a light-weight powerful tool available in two speeds, 5400 and 8500 r.p.m. for 4-in. wheels and buffers. (Buckeye Tool Co.)



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(CONTINUED FROM PAGE 216)

units. This design was described editorially in one of the leading technical magazines as a new principle. This principle is now being applied to a number of machines.

A glaring example of neglect to adapt the machine to changed conditions is found in the upright drill press. As it is designed, it takes care of large or small pieces, either high or low. It can drill large or small holes, either deep or shallow. It fills the requirements of the jobbing shop, the general manufacturing shop, and, as a matter of fact, of the mass production shop. In order to be able to handle work of almost any size, it was left open on three sides. In other words, it had a column at the rear. There is a swinging table to bring various parts of the work under the drill, which has many feeds and speeds, a long stroke, and an adjustment to make it still further adapted to various heights of work and different depths of holes.

The antithesis would be to make a machine with one speed, one feed, just enough working space and height to adapt it to a single piece of work, and with a central supported drill to give it a maximum of rigidity, something which helps to place the hole correctly and is of much importance for the life of the drill.

Such a machine would be of very limited use. It would not do at all for the jobbing shop. On the other hand, the present upright drill has many features entirely useless in mass production, but for which the user has to pay nevertheless.

Much more could be said on this subject. Such questions as to how far one should go with the automatic features of the machine, to what extent provision should be made on such machines for the application of magazine and hopper feed, to what extent one should go with automatic or semi-automatic gaging devices, and many others, will have to be solved sometime.

BE SURE AND VISIT OUR EXHIBIT AT THE MACHINE TOOL SHOW — BOOTH A-209

HIGH PRODUCTION STEEL and CEMENTED CARBIDE CUTTING TOOLS FOR EVERY PURPOSE

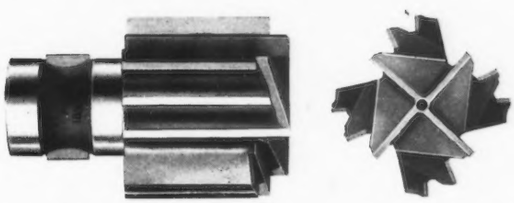
This double-end grinder is specially designed for cemented carbide tools. It has a self-contained reversible motor which enables the operator to work from both sides of the wheel.

THIS MACHINE IS ON EXHIBITION AT BERKELEY ENGINEERING CO., 1381 E. 17th St., Cleveland. During the show transportation will be furnished from the Exhibition Hall.

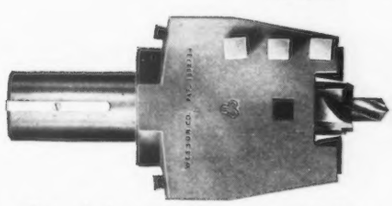
Our standard Counterbore holder.

Wesson full floating tool holders are furnished in all sizes to customers' specifications.

Wesson multi-dimension boring bars are furnished in any size with any number of blades. The blades can be set to decimal dimensions within the size range of the tool.



Above is illustrated our cluster type construction of multi-dimension cutters.



One of the many Wesson combination drilling, boring and facing tools, made to meet customers' requirements.

WESSON CO. 1050 MT. ELLIOTT DETROIT, MICH.

AFTER THE SHOW... *WHAT?*

WHEN the train from Cleveland pulls into town, and you're back from the Show—with a bag full of catalogs and your head full of money-making, money-saving ideas—consider this fact: Taft-Peirce offers you the most direct and productive way to put those ideas to work. Taft-Peirce products and service include:

T-P Small Tools and Gages—for maintaining accuracy of the parts you turn out on your new machines.

T-P Dies, Jigs and Fixtures—for speeding production and cutting unit costs.

T-P Special Production Machines—designed and built to do automatically the operations which can be done only at high cost—or not at all—on even the latest standard machines.

T-P Contract Service—for turning out, at a definite, predetermined cost, parts or complete products to your specifications. The T-P shops will lift the entire production problem off your shoulders, may spare you the expense of adding to your plant. T-P has the men, the machines, the responsibility—manufactures parts or complete units to meet definite quality standards and to meet delivery schedules set before the work is started.

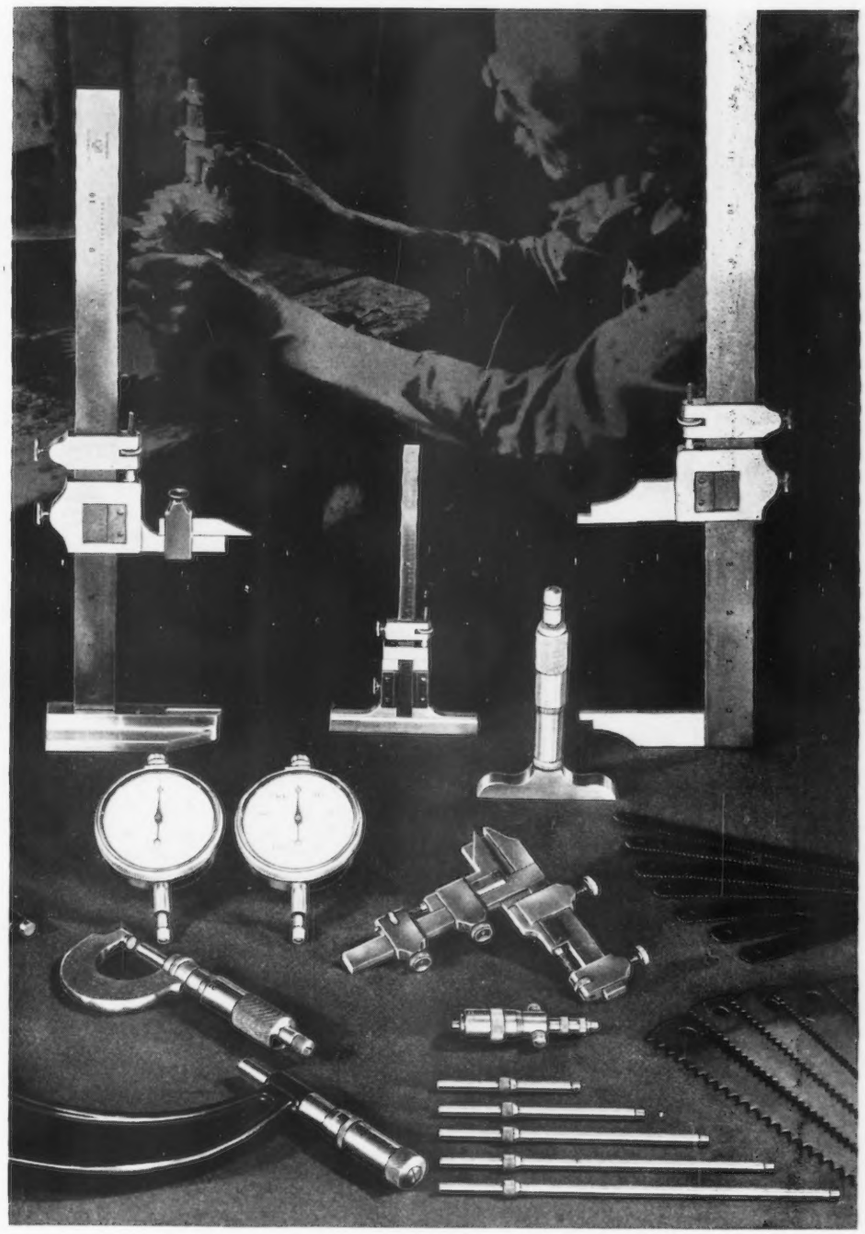
T-P Magnetic Chucks—*SUPERPOWER* chucks that have greater power, permit greater versatility of set-up, heavier cuts and faster feeds.

T-P Mechanical Audit—a study of your plant and its equipment to help you build at the lowest cost. T-P engineers are prepared to write operations, specify equipment, tools and materials, establish piece rates and design any special equipment required.

To put your cost-cutting ideas to work—*now*—put them up to Taft-Peirce Manufacturing Company, Woonsocket, R. I., U. S. A.

TAKE IT TO TAFT-PEIRCE

The Starrett Tools shown in this photograph are Vernier Height Gage No. 454, Vernier Depth Gage No. 448, Vernier Caliper No. 122, Micrometer Depth Gage No. 449, Starrett Dial Indicators 25-A and 25-F, Gear Tooth Vernier Caliper No. 456, 6-inch Micrometer No. 436, 1-inch Micrometer No. 230, Inside Micrometer No. 124-A and Starrett High Speed Hacksaw Blades for hand frames and power machines.



Starrett

MICROMETERS

DIAL INDICATORS

VERNIERS

HACKSAWS

SEE THEM AT THE SHOW . . .

When you admire the new machines at the Machine Tool Show, remember that in most cases Starrett Tools have been used to make them accurate—and that in most cases Starrett Tools will be used to make the work they produce more accurate. Stop at Booth A203 and see the display of Starrett Dial Indicators, Shop Equipment Tools and Hacksaw Blades.

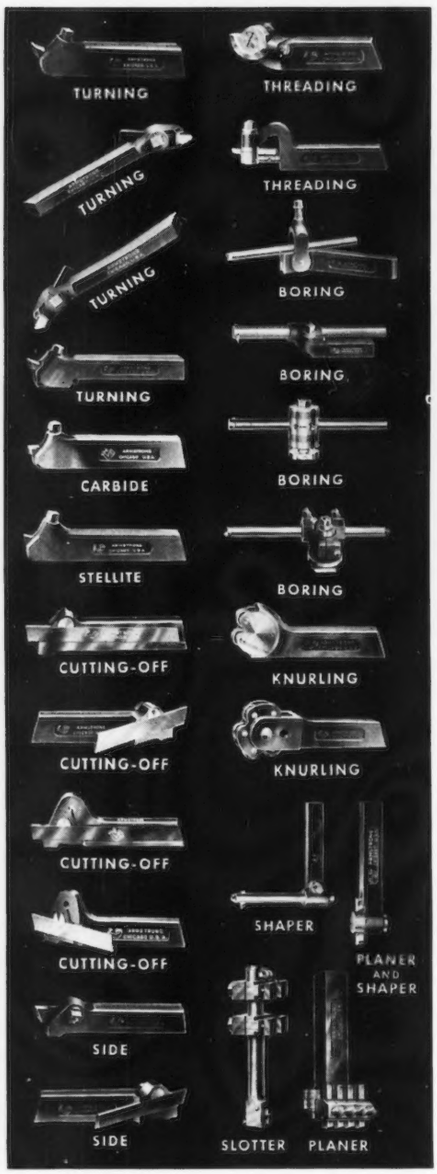
Write for copies of Starrett Catalog No. 25 "AA" and the Special Dial Indicator Catalog.

THE L. S. STARRETT CO.
World's Greatest Toolmakers
Manufacturers of Hacksaws Unexcelled
Steel Tapes—Standard for Accuracy
ATHOL, MASS., U. S. A.

Use Starrett Tools

6485

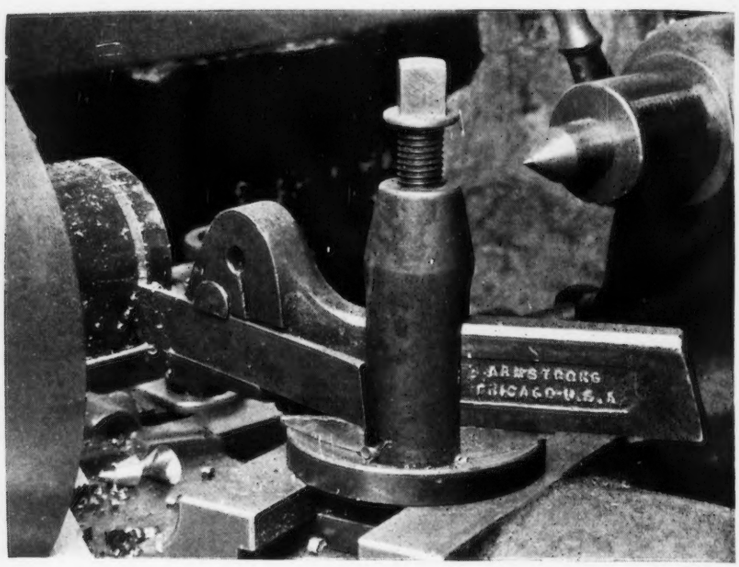
ARMSTRONG



ARMSTRONG Tool Holders, Turret Lathe and Screw Machine Tools. "C" Clamps, Lathe and Milling Machine Dogs, Ratchet Drills, Setting-Up Tools. High Speed Steel. Carbide Cutters, Machine Shop Specialties.

ARMSTRONG BROS. Dies and Stocks, Receding Type Threaders, Pipe Cutters and Cutter Wheels. Pipe Vises, Pipe Wrenches and Chain Tongs.

The Armstrong System of Tool Holders provides permanent multi-purpose tools for every operation on lathes, planers, slotters and shapers



for your new machine tools buy modern ARMSTRONG TOOL HOLDERS

It's as ridiculous to hold back today's machine-tools with forged tools and antiquated tool holders as it would be to put "buggy wheels" on a new high speed automobile. Getting down to basics, the actual cutting is done by the cutter-bit, and the performance of the cutter, and the production of the machine tool, are largely governed by the Tool Holder.

Advances in machine tools, in speeds, feeds and capacities have been more than matched with improvements in the Armstrong System of Tool Holders. Today's ARMSTRONG TOOL HOLDERS are capable of far greater speeds and feeds and far heavier cuts than those generally used. Now there are also ARMSIDE (Carbide-Tipped) Cutters and their Tool Holders, SPRING Cutting-off and Threading Tools for today's tougher steels, improved Boring Tools, improved ARMSTRONG TOOL HOLDERS for every operation on lathes, planers, slotters and shapers and a new line of ARMSTRONG Turret Lathe and Screw Machine Tool Holders that "Save All Forging, 70% Grinding and 90% High Speed Steel."

SEE the MODERN ARMSTRONG TOOL HOLDERS at the Machine Tool Show, Booth A-304 CLEVELAND September 10 to 21

Write for a new B-35 Catalog

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
309 N. Francisco Ave., CHICAGO, U.S.A.
New York Sales Office: 109 Lafayette Street
London Branch: ARMSTRONG BROS. TOOL CO., Ltd.
Pacific Coast Office: 661 Folsom Street, San Francisco, Cal.

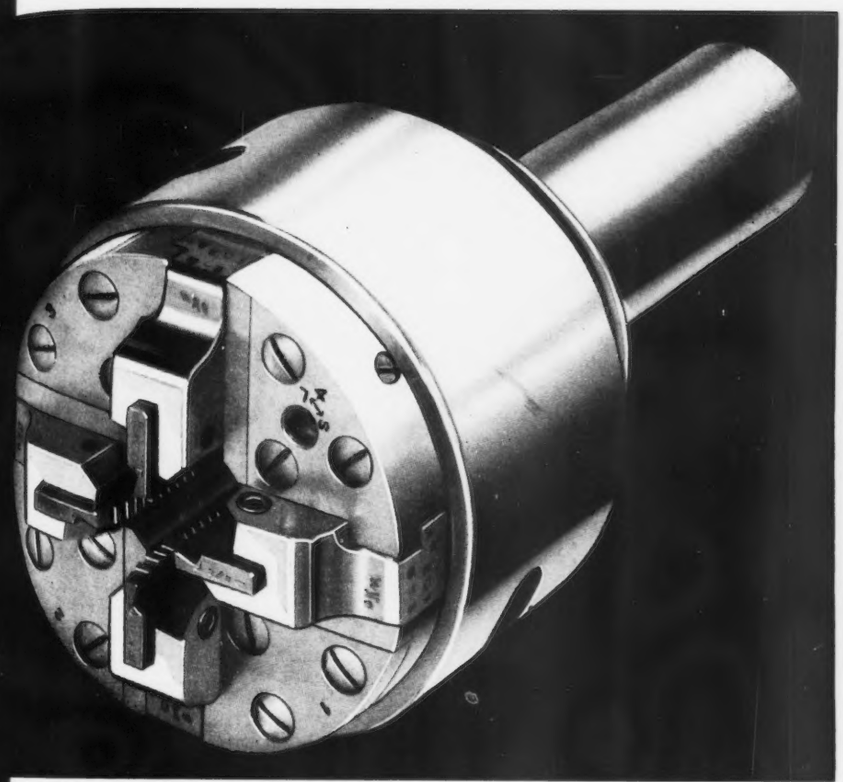
ARMSTRONG TOOL HOLDERS Are Used in Over 96% of the Machine Shops and Tool Rooms.

At the BIG SHOW in CLEVELAND

be sure to see this amazing

H & G DIE HEAD

NEW DIE HEAD *with* INSERT CHASERS



A Revolutionary Improvement in High-Speed Threading The new H & G Die Head with Insert Chasers, originated and developed by this company exclusively, represents the greatest advance in thread cutting since the introduction of the self-opening die head.

New Low Cost for Chasers Per Thousand Pieces Threaded The very low price at which H & G Insert Chasers may be purchased together with the most extraordinary runs which these chasers give before becoming dull, naturally result in much lower chaser costs per thousand pieces.

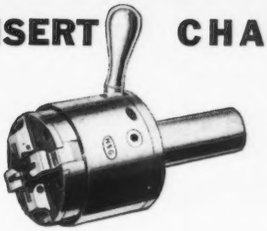
Amazing Gains in Net Production the General Rule The remarkable simplicity of the Insert Chaser Die Head makes the replacement of worn chasers by new a matter of a few minutes. The down time of the machine is less, there are no adjustments to make . . . the daily net production jumps to a new high level. Many plants, after long runs, have concluded the increase is equal to an added half hour for each day for the operator and machine.

Bring Your Threading Problems to the Show, Booth 900 Consult us regarding lower threading cost, better quality of threads and higher rates of production.

THE EASTERN MACHINE SCREW CORPORATION
21-41 Barclay St. New Haven, Conn.

TYLES OF INSERT CHASER DIE HEADS AVAILABLE . . .

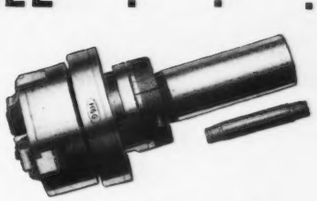
YLE MM for rotary spin-



STYLE MS for hand turret machines.

STYLE DM for B & S Automatics and other small single spindles.

STYLE IMM is equipped with improved internal trip for shoulder threading such as for spark plugs.



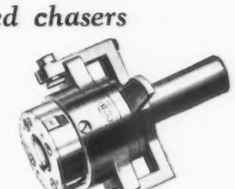
STYLE TM has receding chasers for cutting superior quality taper threads.

ENERAL PURPOSE DIE HEADS

using the famous H & G Hobbed chasers

YLE EE (Rotary). For matics, threaders, etc., re the d'e head rotates.

STYLE C. Hand Closing for hand turret machines.



STYLE D. For Brown & Sharpe Automatics and other small machines.

PREMIER SHOWING AT CLEVELAND

New Variable Speed Threading Machine
New Solid Adjustable Die Head using Regular H & G Insert Chasers

on't miss seeing all of these important developments

THE EASTERN MACHINE SCREW CORP.
21-41 Barclay St., New Haven, Conn.

Please send literature indicated with "X"

- ☐ Insert Chaser Die Head
- ☐ General Purpose Die Head
- ☐ Threading Machines
- ☐ Solid Adjustable Insert Chaser Die

Name.....

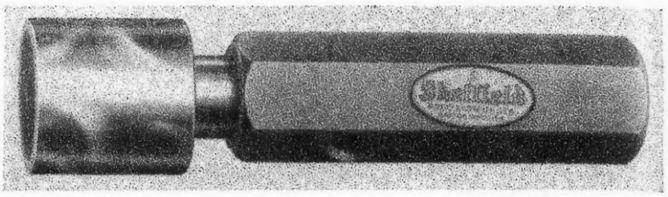
Position.....

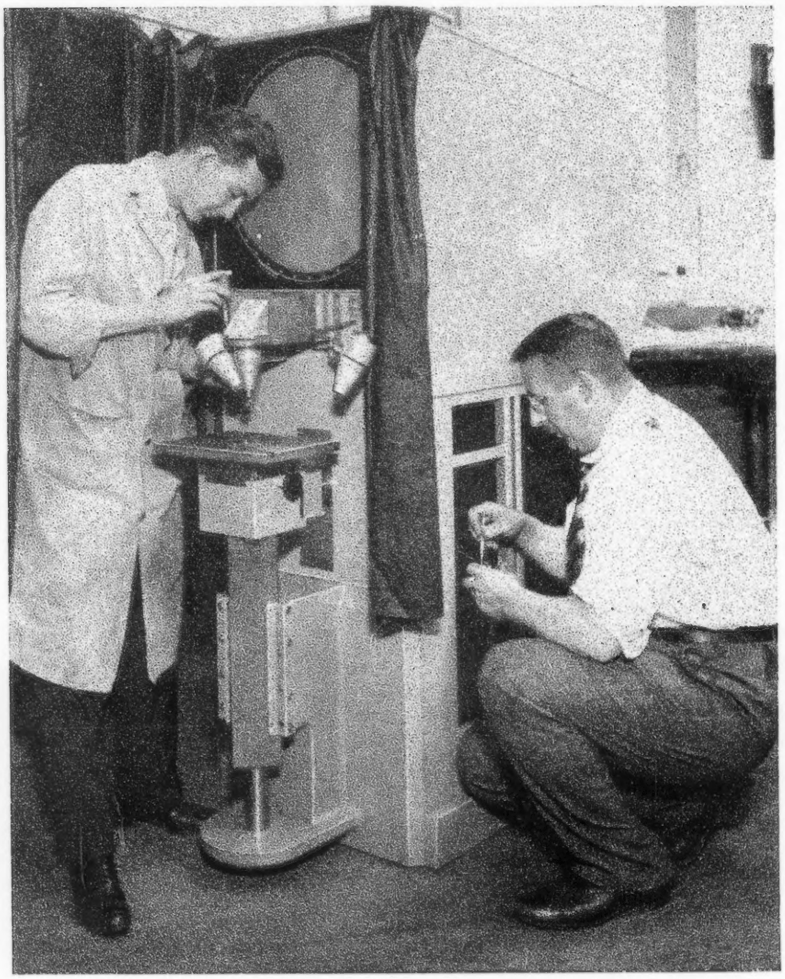
Firm .....

Address.....

AT RIGHT

SHEFFIELD Precision Lapped Plug Gage is a recent improvement of chromium plated plugs with patent pending end reinforcement to prevent stripping of the plating. Special finishing processes are employed to produce smooth, true surfaces of the required accuracy. (Sheffield Gage Corpn.)





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AT LEFT

BAUSCH & LOMB Contour Measuring Projectors with complete new optical system designs are made in two sizes, large and small, the former being shown here. Magnifications range from 10 times to 100 times with interchangeable objectives. Numerous accessories available. (Bausch & Lomb Optical Co.)

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Metal Cutting Tools Keep Pace With Machine Tool Progress

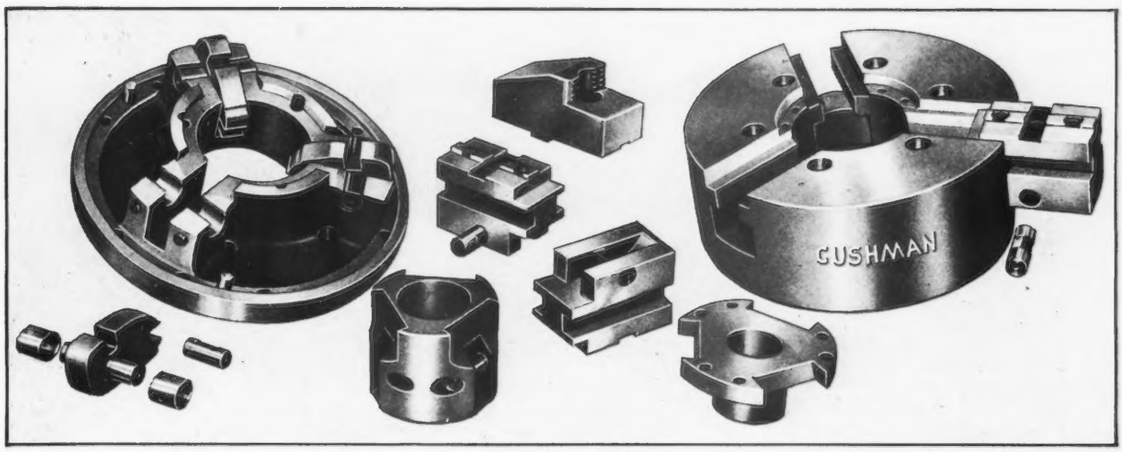
(CONTINUED FROM PAGE 76)

cut, precision boring operations. The boring of connecting rods is a good example of the successful application of titanium carbide.

Considerable difficulty was experienced in the grinding of cemented carbide tools during the early development stage. Satisfactory results were obtained eventually through the use of a fairly coarse, free-cutting wheel, such as a 60 grit with soft bond for rough grinding, and finish grinding with a 100 or 120 grit wheel, all grinding preferably being done wet. Lapping so as to remove the grinding marks near the cutting edges and to obtain a better finish pays dividends due to the longer life of the cutting edges and improved finish on the work. Recently diamond wheels for both grinding and lapping cemented carbides have been placed on the market, these wheels

(CONTINUED ON PAGE 230)

NEW THINGS *at the*



MACHINE TOOL SHOW

Many new machines and tools have been developed since the last National Machine Tool Exposition in 1929. Therefore, you will want to take in the 1935 Exposition in Cleveland, September 11 to 21, and while there drop in at The Cushman Chuck Co. booth (No. 410-E) and see some of the new products.

Mr. H. W. Hultgren, Assistant Secretary, will be in charge, and he will be glad to show you the following Cushman products:

1. **"NO. 730 CUSHMATIC CHUCK"**—the electric power chuck for engine and turret lathes, etc. It will be shown operating under its electrically controlled No. 70 rotating Power Unit (Bulletin 120-C).

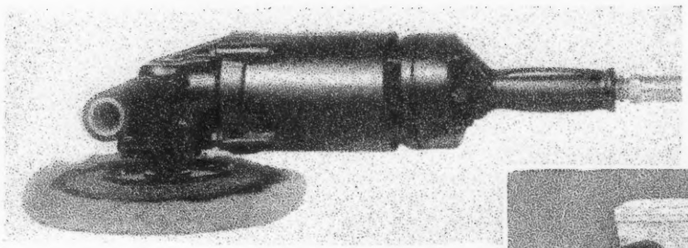
2. **"NO. 4-C-7 PULL-PUSH-POWER"** — the new power unit which converts rotary motion to straight line motion. This is an electrically operated Power Unit which will be demonstrated in action with a clevis connection on a frame designed for the purpose. (Bulletin 127).

3. **"HAND OPERATED LATHE CHUCKS"** Specimens of several Cushman light, medium, and heavy duty types. Note particularly the new standardized backs. (Bulletin 48).

We will be glad to mail you any of these bulletins, and hope you will stop and see us at the Cleveland Show.

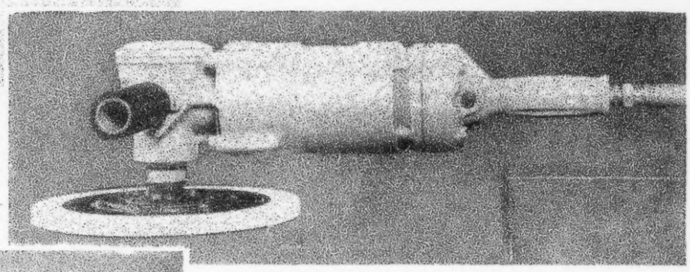
The CUSHMAN CHUCK CO.

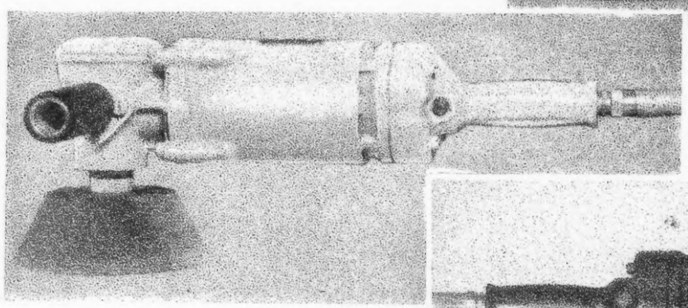
HARTFORD, CONN.

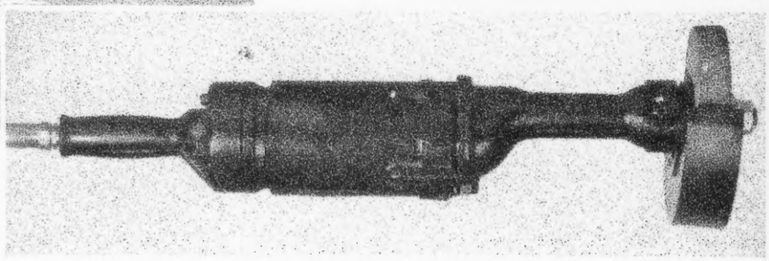


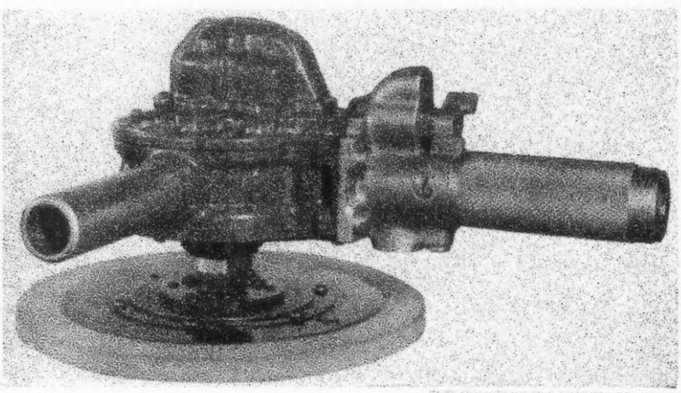
GROUP

ROTOR Air Tool Co.'s High Cycle Electrical Tools are a new line which includes 4, 6, and 8-in. grinders, 6 and 8 in. buffers, 7 and 9-in. sanders and 6-in. right angle grinder. Made in two weight classes, 13 and 15 lb. (Rotor Air Tool Co.)



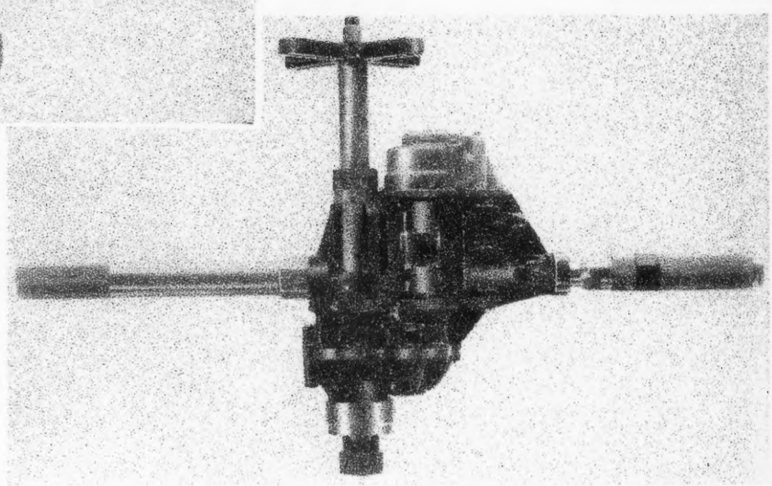






AT LEFT

ROTOR Air Tool Co.'s Type B-1 Sand Disk Grinder carries a 9-in. sanding pad and weighs but 10 lb. It is of the pneumatic type and has been designed with exceptional balance and accurate control. (Rotor Air Tool Co.)



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AT RIGHT

ROTOR Air Tool Co.'s Type E-50-C Drill is designed with a weight of 20 lb. and is made in two speeds, 450 and 360 r.p.m. Latter size is rated for drilling to 1 in. New type governor controls free speed. (Rotor Air Tool Co.)

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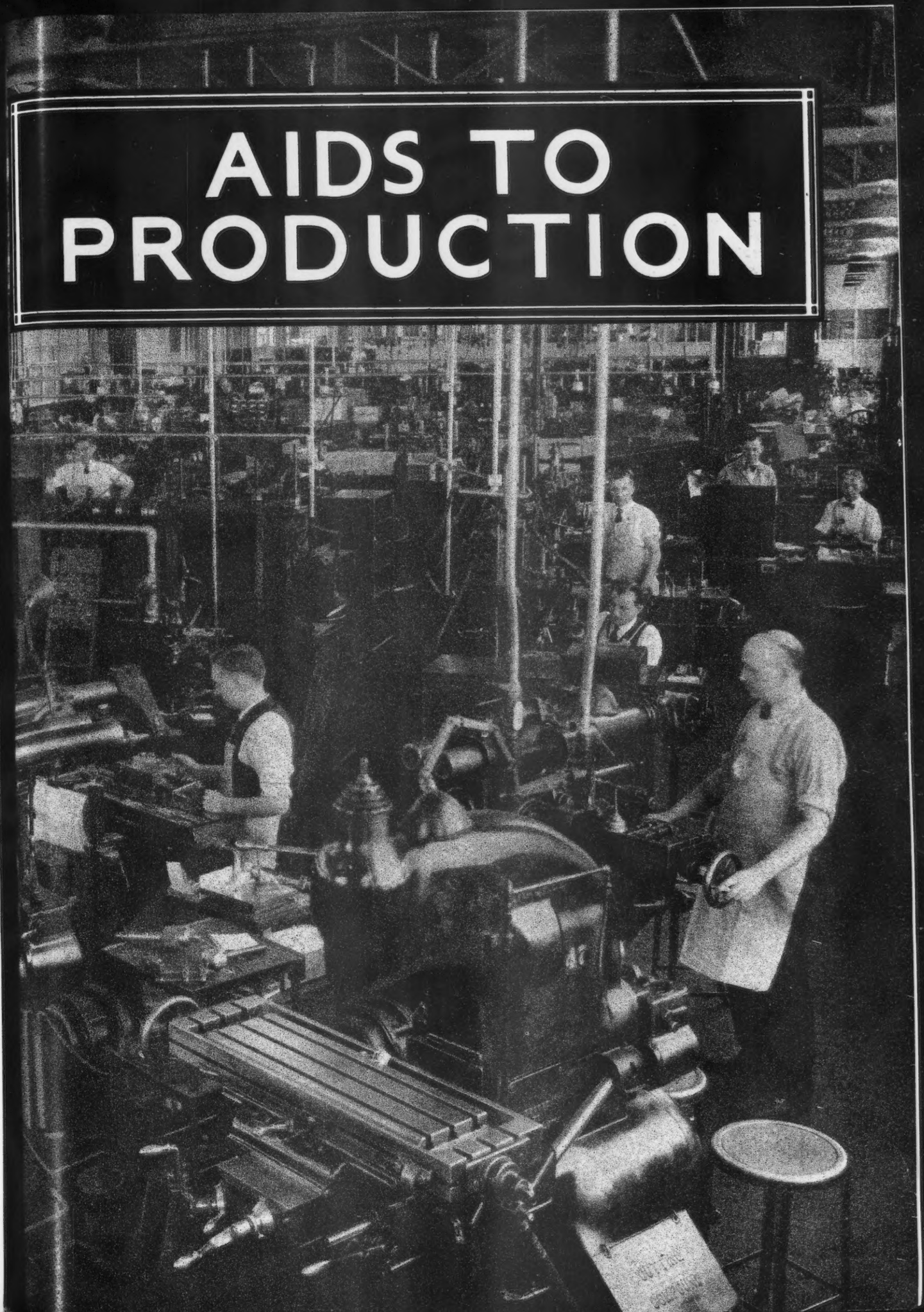
AIDS TO PRODUCTION



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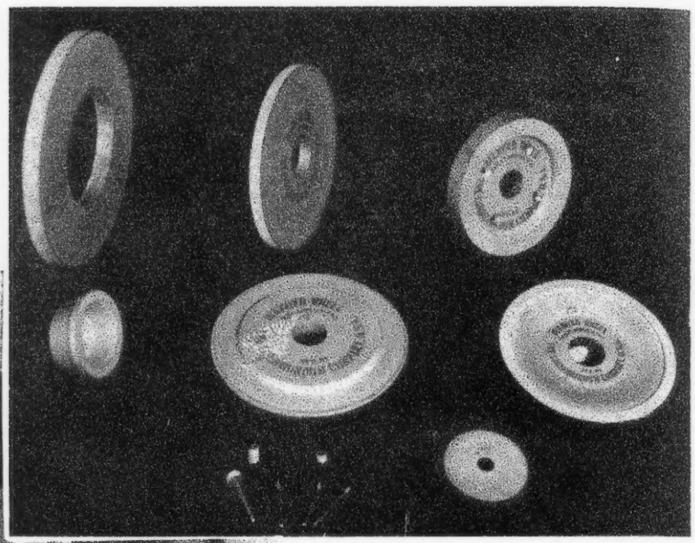
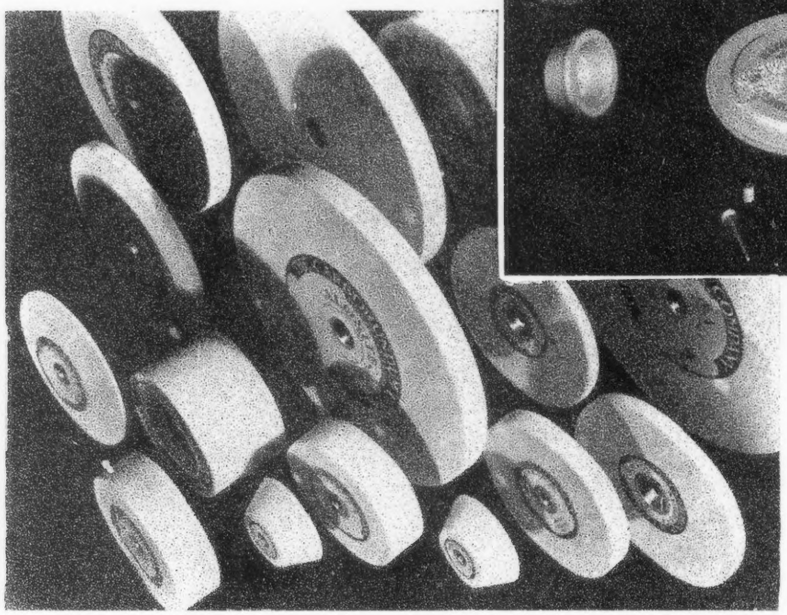
CARBORUNDUM Aloxite Brand "AA" Tool Room Grinding Wheels are produced in combination with the new "170" bond which is claimed to produce a much freer cut.





ALSO new are the Carborundum "270" Bond Tool Room Wheels, made especially for use in duplication of grinding operations. (Carborundum Co.)

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(CONTINUED FROM PAGE 226)

now being used widely with excellent results.

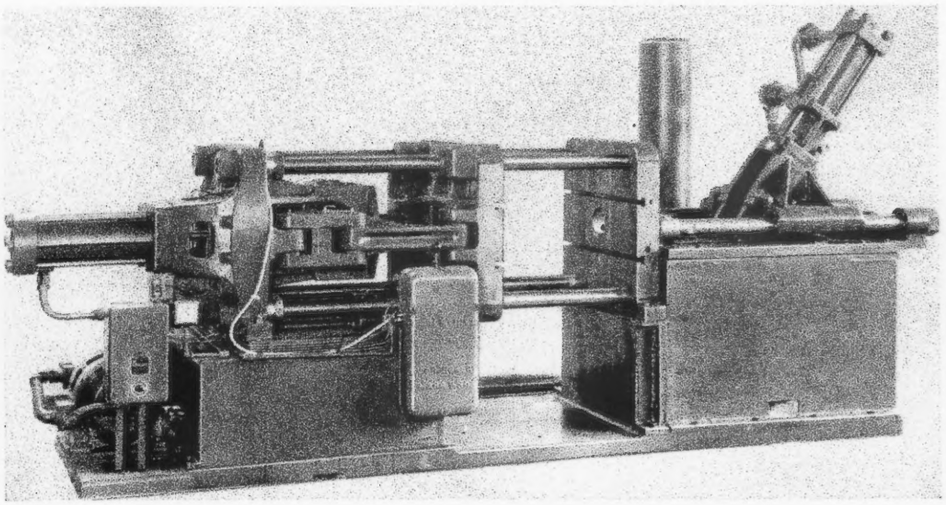
Just a word as to the design of carbide-tipped tools. Manufacturers soon learned that tool design as applied to high-speed steel tools could not be followed for cemented-carbide tools, due to the greater brittleness of the carbide material. Correct tool angles, such as clearance, back and side rake angles, have been worked out for the various types of materials machined. The user should carefully maintain these tool angles during all regrinding operations, otherwise early failure will occur. Figs. 11-13 show different types of tungsten carbide-tipped tools in service today.

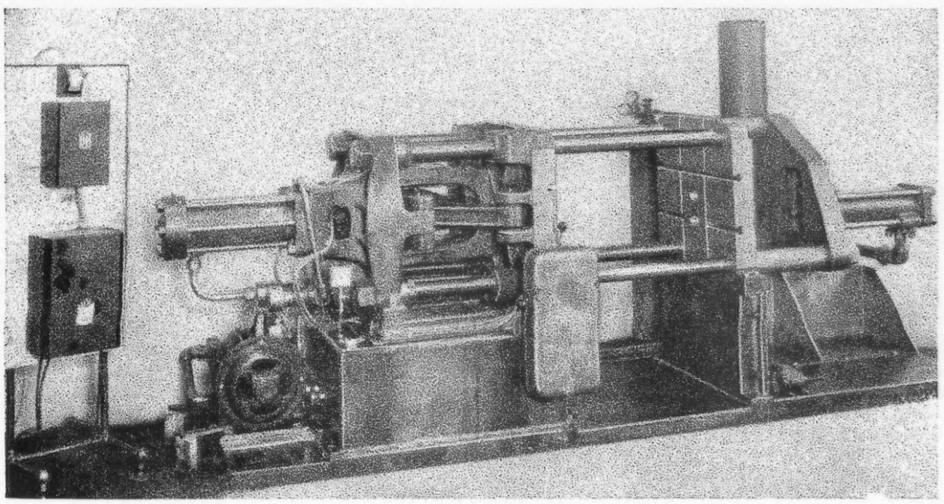
Cemented carbide manufacturers are sparing no expense in further improving existing grades of carbides and the development of new materials. The automotive manufacturers are the largest users of cemented carbides, splendid economy being effected through the proper application of these new cutting materials. With increased knowledge of the operating requirements of carbide materials and with further improvements in the quality of the existing product, the more complicated types of cutting tools tipped with carbide will be used more extensively.

The extensive use of cemented tungsten carbide turning tools has resulted in redesigning of certain types of machine tools to provide the high speeds that must be employed to economically use this material. Chip disposal is now a serious problem due to the high rate of metal removal, and chip breakers of various designs have been developed. Care must be taken to make certain when breaking up the chip that pressure is not transmitted back to the cutting edge through the chip, thus shortening the life of the tool.

Stellite Used Satisfactorily

Stellite cutting tools have been used satisfactorily for many years, economically machining many types of materials, including non-metallic materials such as hard rubber and plastics, brass, bronze and aluminum alloys, cast iron and some types of steels. Since its recent introduction, J-Metal, the improved grade of Stellite, has been making splendid records for production and cutting efficiency. Generally speaking, J-Metal tools are operated at speeds up to 50 per cent faster than the high speeds at which the older grade No. 3 Stellite is operated, with the same tool life between grinds. It is claimed that where increased cutting speed is impractical J-Metal tools used at the established speed





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REED-PRENTICE Full Hydraulic Die Casting Machines are now represented in three sizes with piston diameters of 2½, 3¾, and 4½-in. strokes of 6, 8 and 10 in., and pressures up to 4900, 11,000 and 16,000 lb. respectively. Hydraulic operation throughout and arranged for manual and automatic operation. (Reed-Prentice Corpn.)

o o o

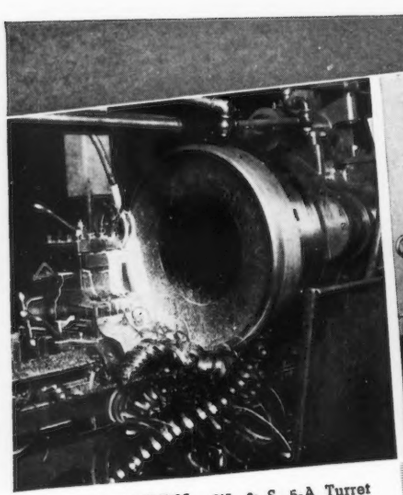
for grade No. 3 Stellite tools are giving from two to four times as many pieces per grind.

Stellite J-Metal is a non-ferrous alloy of cobalt, chromium and tungsten, possessing to a high degree the characteristic of "red hardness." It is the ability to remain hard even at a red heat that enables this material to continue cutting for such long periods at high speeds.

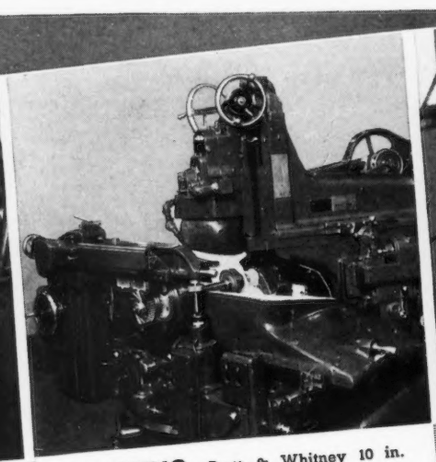
J-Metal tool bits, milling cutter blades and welded tip tools are used on a large number of machining operations in high production shops, especially the automotive manufacturing plants. Cylinder blocks and heads, pistons, transmission and crankcases, flywheels, fuel and water pumps and many other parts are being machined regularly and satisfactorily in Metal tools. Figs. 14-17 show a few interesting applications of J-Metal tools.

Industry is rapidly finding the best applications for these non-machinable hard cutting materials such as cemented carbides and Stellite. Soon after the introduction of cemented tungsten carbide the opinion was quite freely expressed that these hard cutting materials would soon greatly lessen the demand for regular high-speed steel cutting tools. It is now generally realized that while these splendid some automotive plants with J-new cutting materials are saving manufacturers a nice sum yearly in their tool cost, the demand for high-speed steel metal-cutting tools will continue to increase as the years go by due to new designs, improved types of high-speed steel, new developments in hardening treatments, etc.

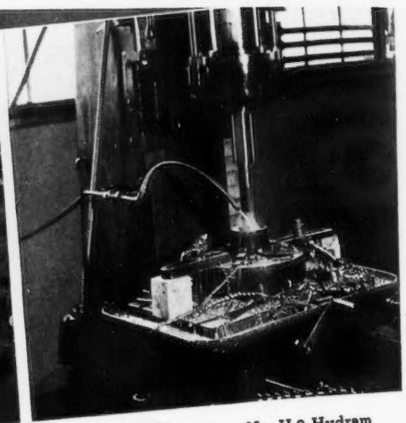
The author wishes to acknowledge with deep appreciation the data received from the Firth-Stirling Steel Co. and the Carboloy Co. on cemented carbide tools, the text and illustrations furnished by the Haynes Stellite Co., and the data received from the Standard Tool Co., on recent developments in twist drill design.



LATHE WORK. W. & S. 5-A Turret Lathe. Courtesy Warner & Swasey Co., Cleveland.



GRINDING. Pratt & Whitney 10 in. Helical Gear Grinder. Courtesy Buck & Hickman, Ltd., London, Eng.



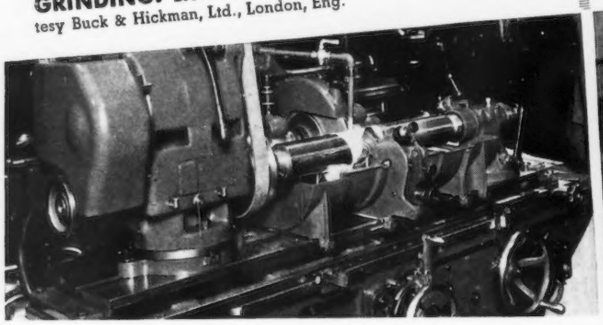
DRILLING. Barnes No. H-2 Hydram Self-Oiling Driller. Courtesy Barnes Drill Co., Rockford, Ill.

Sunoco "has what it takes" to aid machine tools give rated output

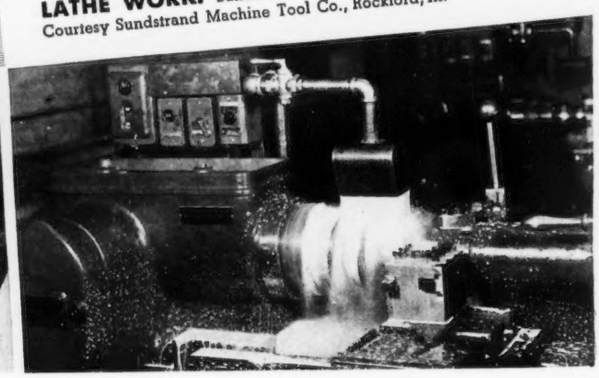
OUTSTANDING PERFORMANCE—OVER MANY YEARS. Check the records of machine tool manufacturers or leading metal cutting plants. You'll find Sunoco on the job . . . chosen for difficult, exacting work. Talk to executives, superintendents, operators . . . you'll learn Sunoco wins preference because it definitely aids in securing rated machine tool capacity.

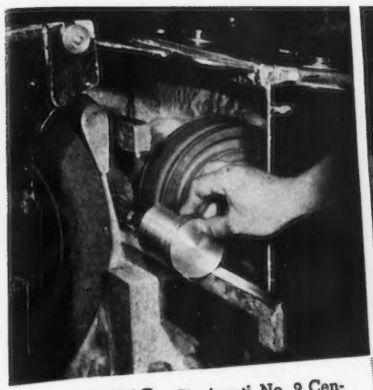
GREATER ACCURACY, EVEN AT HIGH SPEEDS. Sunoco properly lubricates cutting tools, reduces frictional heat; lessens time lost from too-frequent sharpenings. Deeper and faster cuts are made possible—with precision maintained and quality finish assured.

GRINDING. Brown & Sharpe No. 2 Universal Grinder. Courtesy Buck & Hickman, Ltd., London, Eng.

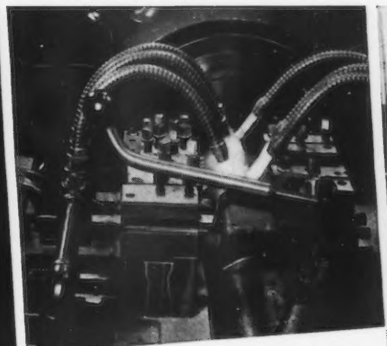


LATHE WORK. Sundstrand 10 in. Automatic Stub Lathe. Courtesy Sundstrand Machine Tool Co., Rockford, Ill.

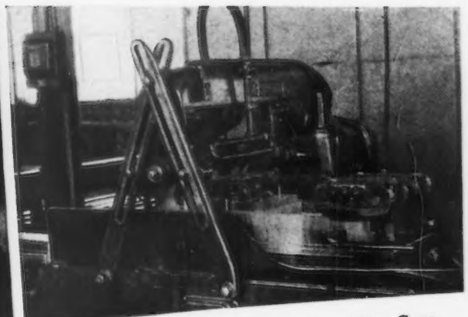




GRINDING. Cincinnati No. 2 Centerless Grinder. Courtesy Cincinnati Milling Machine & Cincinnati Grinders, Inc.



LATHE WORK. Monarch Magna-Matic Lathe. Courtesy Monarch Machine Tool Co., Sidney, O.



MILLING. Cincinnati Hydromatic Miller. Courtesy Cincinnati Milling Machine & Cincinnati Grinders, Inc.

USED BY LEADING PLANTS. For years we have pictured and described in the trade press, as we do here, operations in leading shops. This series has shown the adaptability of Sunoco, its widespread use, the calibre of the firms who rely on it. Remember—20 years of trade usage stand back of Sunoco!

SUN OIL COMPANY
Philadelphia, Pa.

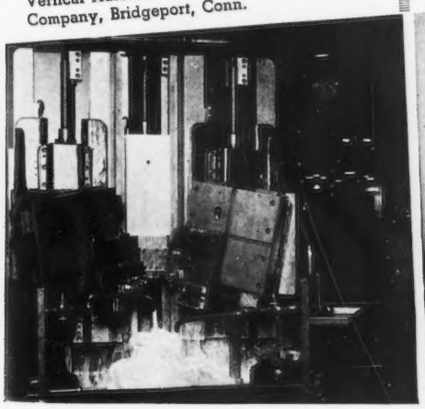
Test Sunoco . . . Compare It!

We particularly urge a test of Sunoco in your own plant, under your own operating conditions, in comparison with other cutting fluids. Our engineers will gladly assist you.

Correspondence and inquiries are cordially invited.

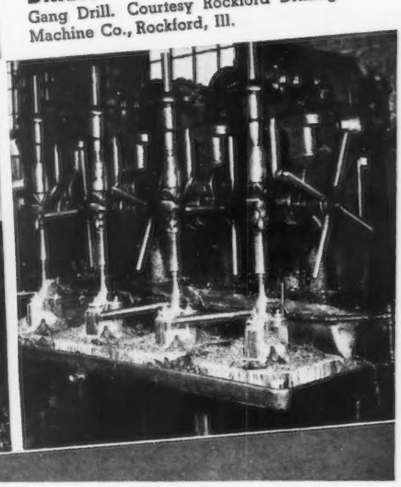
SUNOCO
EMULSIFYING
CUTTING OIL

LATHE WORK. Bullard Single—Spindle Vertical Automatic Lathe. Courtesy Bullard Company, Bridgeport, Conn.



GRINDING. Sellers No. 2 B Drill Grinder. Courtesy Wm. Sellers & Co., Philadelphia, Pa.

DRILLING. 26 in. Rockford 4-Spindle Gang Drill. Courtesy Rockford Drilling Machine Co., Rockford, Ill.



The Dealer Renders Real Service

By W. F. McCARTHY

President, Associated Machine Tool Builders

W. F. McCARTHY

DEALER selling is as old as the industry and quite as unique in the commercial world. In general, we are such an integral part of this industry that the names; dealers and machine tools, have become almost synonymous. I am sure numerous dealers, who have been for years identified with specific lines, could give many examples of customers frequently requesting quotations on various types of machines without reference to maker's name, but with full confidence that the right make of machine would be quoted.

I do not know a representative manufacturer who, in his early days, did not depend upon some dealer to introduce his product. Several such companies could be cited as having been represented by the same dealer for long periods; in some cases continuously for more than 50 years. Others, when they have grown to a size sufficient to support a sales organization, have found it in their interest to sell direct. Some years ago, especially during the war and the immediate prosperous years following, there was a pronounced movement toward direct selling, but in the more recent lean years the pendulum seems to be swinging the other way, as many representative companies have returned to dealers, to the extent that probably more than 75 per cent of the builders now depend on dealers for distribution. This is not strange once it is appreciated that the dealer contributes much beyond the actual machine sale. He is obliged to maintain a large sales organization in a compact territory. When sales personnel is properly selected and assigned, it assures more frequent contacts than are possible economically with a single line of tools. Intimate relations and business confidences are the direct result. Such relations are not common where the direct representative is compelled to travel a wider area with a limited line.

There are, quite naturally, two definite schools of thought on dealer versus direct selling. The cost of selling is one point on which there is no agreement. Cost varies with sales volume, also with the method of accounting employed. The manufacturer who sells direct can exercise much latitude in fixing his selling cost, while the dealer must maintain his organization on his sales commission or go out of business. Thus actual costs are kept within definite bounds. The manufacturer who employs dealer distribution, when properly represented, is relieved of many sales responsibilities, including the very important and sometimes expensive factors of credit and financing. He receives his payments when they are due regardless of when the customer pays. He is free to devote his time and energy to the manufacturing problems of his business. These, in the present state of the art, are real problems. When an inquiry develops in a given territory, he is assured that the inquiry will have prompt attention and at no additional cost to him. The advantage of such attention to the buyer as well is obvious. Local representation insures better credit judgment than can be expected of the manufacturer who contacts only infrequently at times when his particular type of machine is under consideration. The dealer on the other hand, because of his various lines, has a running experience to guide him.

During the last decade our Association, through its officers, has devoted much time in striving to improve methods, and particularly the ethics, of dealer selling. Those of us who have interested ourselves in this work are gratified with the cooperative results attained. These improvements are reflected in better business methods, due in part to a better trained personnel with a keener appreciation of responsibilities, and with a more technical knowledge of what they are selling than was possessed prior to these improved conditions. Today salesmen are qualified to and do advance to our manufacturers and customers many ideas that lead to major improvements over the years—special tooling, machine design, new ways of doing a job, and even new jobs to be worked out when the customer's confidence is such that he feels free to disclose his future plans in gaining the assistance he knows can be expected when a detailed study of his requirements is made by the salesman who is out to serve.

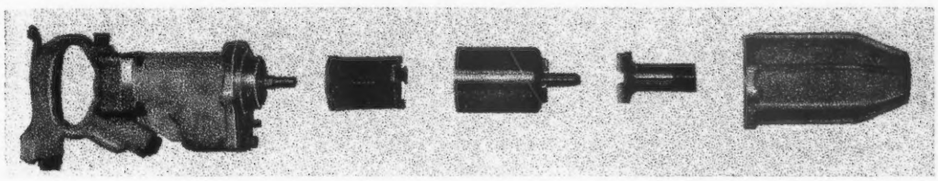
Dealer selling has another distinct virtue—it is a time saver for the busy executive. The late J. A. Smith, superintendent of the General Electric Co., once publicly stated, in effect, that if it is necessary to deal with direct factory representation through individuals on a matter of five or six separate tools, it might take nearly all day to interview the five or six representatives, whereas it would be an easy matter to sit down with a well-informed dealer salesman and close the whole job out within a half hour.

In conclusion, it is my firm conviction, based on 35 years of experience in dealer selling, that this is the most efficient and economical selling method for marketing machine tools.

Intimate acquaintance with the customer as developed by this method is of great importance to all concerned. We know their circumstances and their requirements and we have the facilities for serving them.

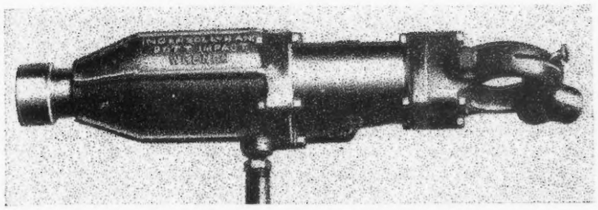
This prompts my final observation that the dealer is rendering a real service to the metal-working industry and to society as well. And I hope one day to see our dealer efforts given even greater recognition both materially and in its spirit of presentation.

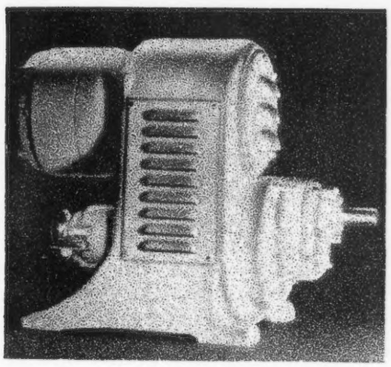
FIRST AIDS TO PRODUCTION



AT LEFT

INGERSOLL-RAND Pott Impact Wrench is a new type of wrench which operates on impact. It is now furnished reversible for removing as well as applying nuts. Another new feature is air-cooling of the accumulator, which prevents overheating. (Ingersoll-Rand Co.)





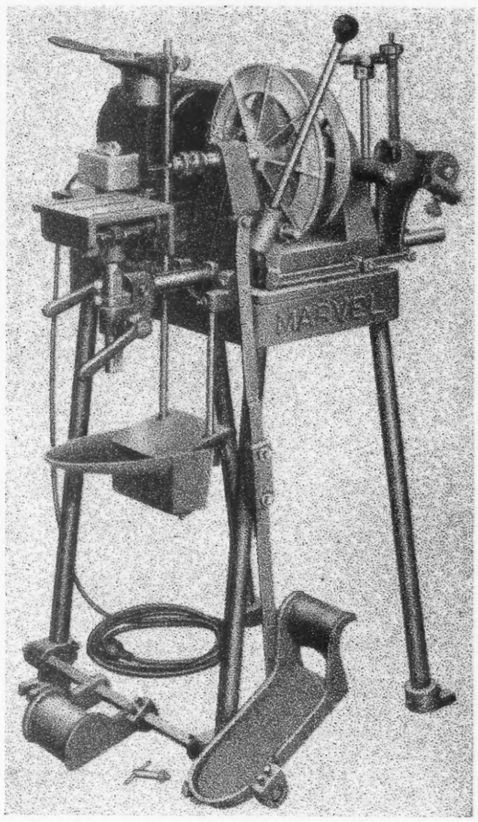
ABOVE

U. S. Electrical Motors has produced this new design. VariDrive in the upright style, providing material space saving. Take-off shaft can be had in either high or low position. (U. S. Electrical Motors, Inc.)

o o o

AT RIGHT

ARMSTRONG-Blum Marvel Horizontal Friction Tapping - Threading Machines are produced in a line of seven sizes having capacity from No. 0 taps up to 1/2 in. U.S.S. in steel. There is a spring return table on all models with fine screw adjustment for depth stop. (Armstrong - Blum Mfg. Co.)



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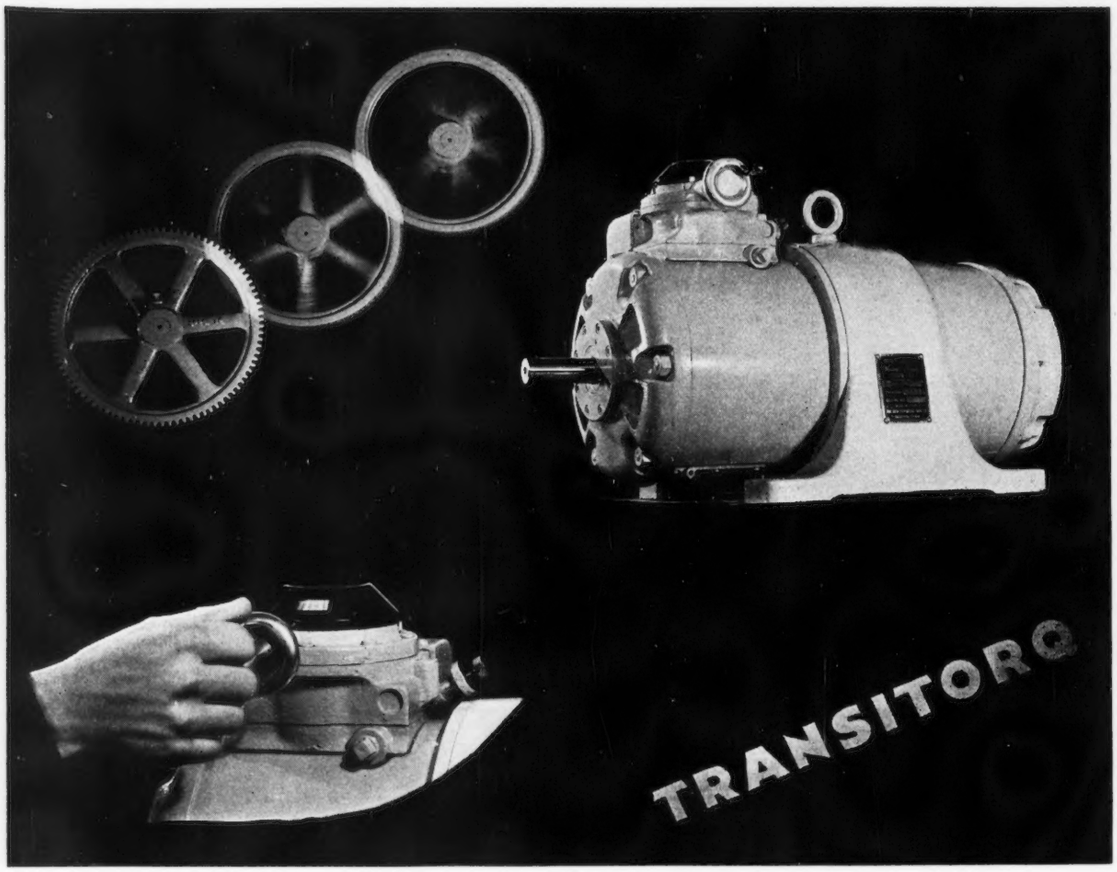
New Abrasives and Grinding Wheels for New Cutting Tools

THE remarkable developments in alloy steel and cemented carbide cutting tools within the past six years have been matched by equally remarkable developments in abrasives and grinding wheels used for fashioning and sharpening these new high-production tools.

The cutting carbides, in particular, furnish an outstanding example of the resourcefulness and capacity for research to be found within the grinding wheel industry. When cemented tungsten carbide (and later cemented tantalum carbide) was first introduced to American industry a few years ago, grinding wheel manufacturers were called upon to produce suitable wheels for grinding this sensationally hard and durable material. Here was a new cutting tool, without the least resemblance in composition and physical characteristics to the familiar high-speed steel and Stellite. The "red" and "white" aluminum oxide wheels

(CONTINUED ON PAGE 241)



THOUSANDS OF SPEEDS . . .

at the touch of a finger

NOW, for the first time, *infinite* speed change becomes available at the touch of a finger — the flash of a light — or the passing of time.

Not only is the Transitorq a transmission whose speed is *infinitely adjustable* over a wide range — but its marvelous ease of speed control — immediate or remote, manual or automatic — presages a revolutionary advancement in increased production and lower costs in every industry.

A positive drive under all conditions. Desired speed may be selected before starting or changed by fingertip control while running.

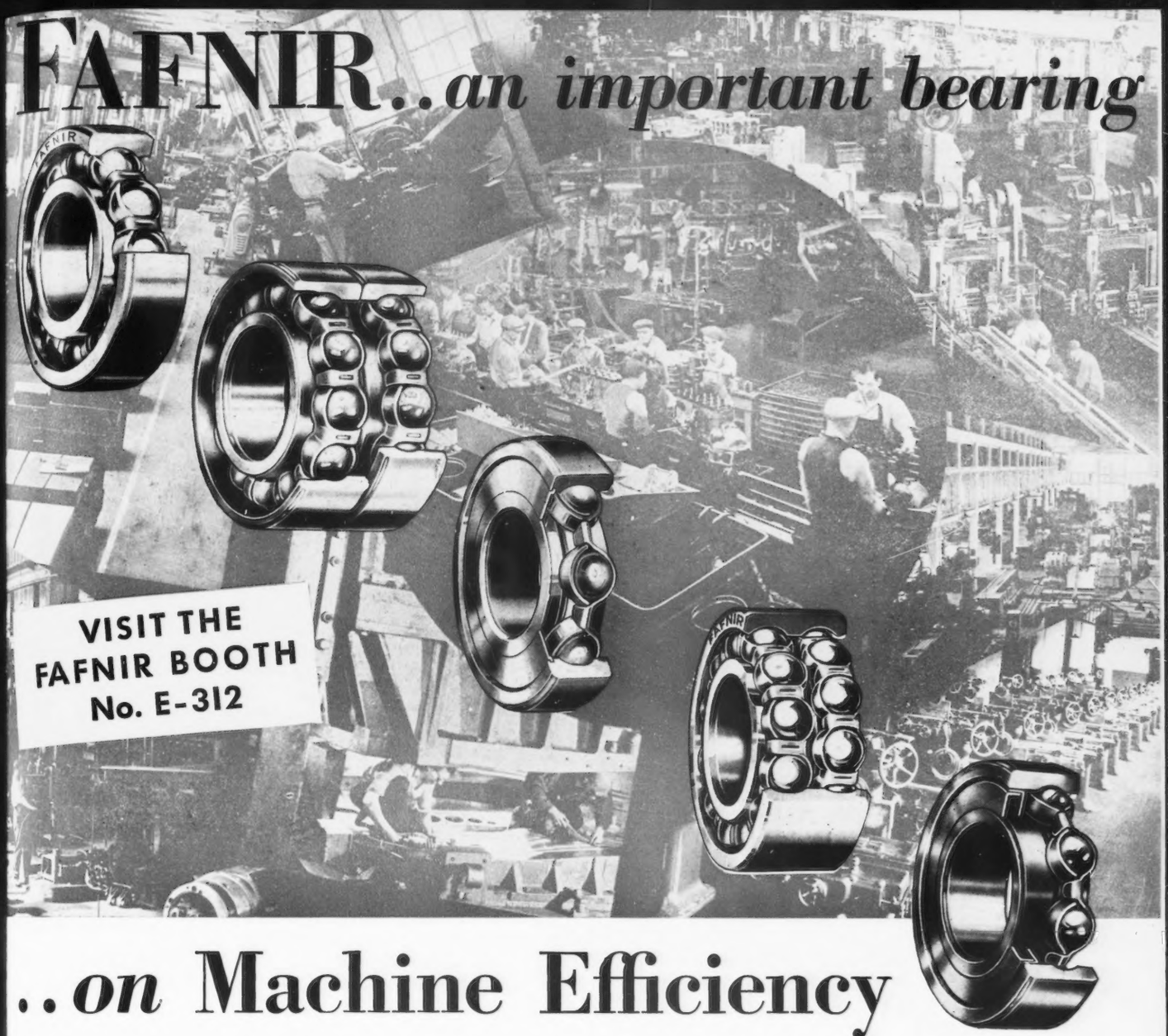
Automatically returns to low-speed, high-torque starting position whenever stopped. Accelerating time to preselected speed is adjustable.

Built as a compact unit with any make of motor. Adaptable to any mounting position —vertical or horizontal, sidewall or floor.

Catalog PI upon request. The New Departure Mfg. Co., Bristol, Conn., a division of General Motors.

NEW DEPARTURE *Variable Speed* TRANSITORQ

FAFNIR...*an important bearing*



..*on* Machine Efficiency

Motion and machines are linked inseparably. When motion is to perform useful work in an efficient manner, while maintaining predetermined standards of accuracy, one feature of design has the unanimous support of the machine tool industry—ball bearings at all vital points.

In keeping abreast of the specific demands which higher rates of speed and greater accuracy of machining impose, Fafnir has developed a line of bearings which truthfully can be described as "the most complete line of ball bearings in America." But, more than this ability to supply the exact type and size for every application, Fafnir builds to such exacting standards that perfect duplication of enduring, friction-free support is always assured.

Duplex, pre-loaded, grease-shield, felt-seal —name any type of bearing for any service and you will find a Fafnir that has proved its outstanding quality through years of service. And bear in mind that Fafnir's machine tool specialists—experts in divorcing friction and wear from motion—place their years of practical experience at your disposal. THE FAFNIR BEARING COMPANY, *New Britain, Connecticut.*

Atlanta . . . Chicago . . . Cleveland . . . Dallas . . . Detroit . . . Milwaukee . . . Minneapolis . . . New York . . . Philadelphia.

Keep abreast of new developments. Read Fafnir's house organ, "The Dragon." We will gladly put you on the mailing list.

FAFNIR Ball Bearings

"The Most Complete Line of Ball Bearings in America"

IN STEP WITH MODERN MACHINE

THREE factors, in the main, have kept G-E equipment for machine tools abreast of the times and have also enabled us to build electric equipment with a reputation for profitable performance. And it is profitable performance that stands behind industry's marked preference for G-E equipment on its machine tools.

1. Years of co-operation with leading machine-tool manufacturers
2. An intimate knowledge of machine-tool problems gained as a large user of machine tools
3. Acknowledged engineering ability and continuous research

YOU ARE CORDIALLY INVITED TO VISIT THE G-E EXHIBIT AT THE NATIONAL MACHINE TOOL EXPOSITION. BOOTH E-206

G E N E R A L

TOOL DESIGN ★ ★ ★ ★ ★

THESE MANUFACTURERS WILL HAVE G-E EQUIPPED MACHINES AT THE SHOW

Booth No.	NORTH EXHIBIT HALL
1	Charles H. Besly & Co.
3	O. S. Walker Co., Inc.
13	The Ohio Machine Co.
14	The Hall Planetary Co.
15	Charles G. Allen Co.
19	W. B. Knight Machinery Co.
20	The Cleveland Automatic Machine Co.
23-A	National Machinery Co.
24	The Thompson Grinder Co.
25	The Bridgeport Safety Emery Wheel Co.
27	Brown & Sharpe Mfg. Co.
	ARCADE
C	Reed-Prentice Corp.
D	The Lapointe Machine Tool Co.
E	Gould & Eberhardt
H	H. Geo. Gorton Machine Co.
	NEW NORTH ANNEX
101	Norton Company
103	The Geometric Tool Co.
106	Racine Tool & Machine Co.
108	The Arter Grinding Machine Co.
109A	Acme Machine Tool Co.
110	Giddings & Lewis Machine Tool Co.
111	Buffalo Forge Co.
112	Gisholt Machine Co.
200	Foster Machine Co.
201	Barnes Drill Co.
202	The Lucas Machine Tool Co.
203	Bryant Chucking Grinder Co.
204	Landis Machine Co.
205	Bullard Co.
206	The Heald Machine Co.
207	Cincinnati Milling Machine Co.
208	Oliver Instrument Co.
305	The Fellows Gear Shaper Co.
306	Sundstrand Machine Tool Co.
307	Gallmeyer & Livingston Co.
307A	The Producto Machine Co.
307B	Baker Bros., Inc.
307C	Porter Cable Machine Co.
309	Blanchard Machine Co.
400	Kearney & Trecker Corp.
401	William Sellers & Co., Inc.
402	The Hendey Machine Co.
403	Leland-Gifford Co.
404	The Hanson-Whitney Machine Co.
405	The Abrasive Machine Tool Co.
406	The Cincinnati Bickford Tool Co.
601	The National Acme Co.
602	Potter & Johnston Machine Co.
603	The Cincinnati Shaper Co.
604	The Taylor & Fenn Co.
607	Jones & Lamson Machine Co.
800	Springfield Machine Tool Co.
810	Ingersoll Milling Machine Co.
811	Gleason Works
813	The Monarch Machine Tool Co.
900	Eastern Machine Screw Corp.
901	The American Tool Works Co.
903	Barber-Colman Co.
904	The Carlton Machine Tool Co.
905	Warner & Swasey Co.
906	Pratt & Whitney Co.
909	The New Britain-Gridley Mach. Co.
912	The Foote Burt Co.
913	Van Norman Machine Tool Co.
914	Seneca Falls Machine Co.
1001	The R. K. LeBlond Machine Tool Co.
1006	Davenport Machine Tool Co.
1008	The Goss & deLeeuw Machine Co.
1009	Kingsbury Machine Tool Corp.
1010	Rivett Lathe & Grinder, Inc.
1012	The G. A. Gray Co.
	Accessories Section
	EXHIBITION HALL
E-203	The Chas. L. Jarvis Co.
E-206	General Electric Co.
E-210	Colt's Patent Fire Arms Mfg. Co.
E-302	Link-Belt Co.
E-308	Henry & Wright Mfg. Co.
E-309	Toledo Scale Co.
E-314	The Rotor Air Tool Co.
E-315	The V & O Press Co.
E-406	The New Departure Mfg. Co.
	ARENA
A-209	The Leon J. Barrett Co.
A-301	The Producto Machine Co.

011-73

ELECTRIC

o o o

AT RIGHT

SAVAGE Nibbling Machine No. 109, with throat depth of 9 in. and thickness capacity of 1/8 in. in mild steel, is a bench model machine now available for template cutting and line cutting. No secondary operations are required. (W. J. Savage Co.)

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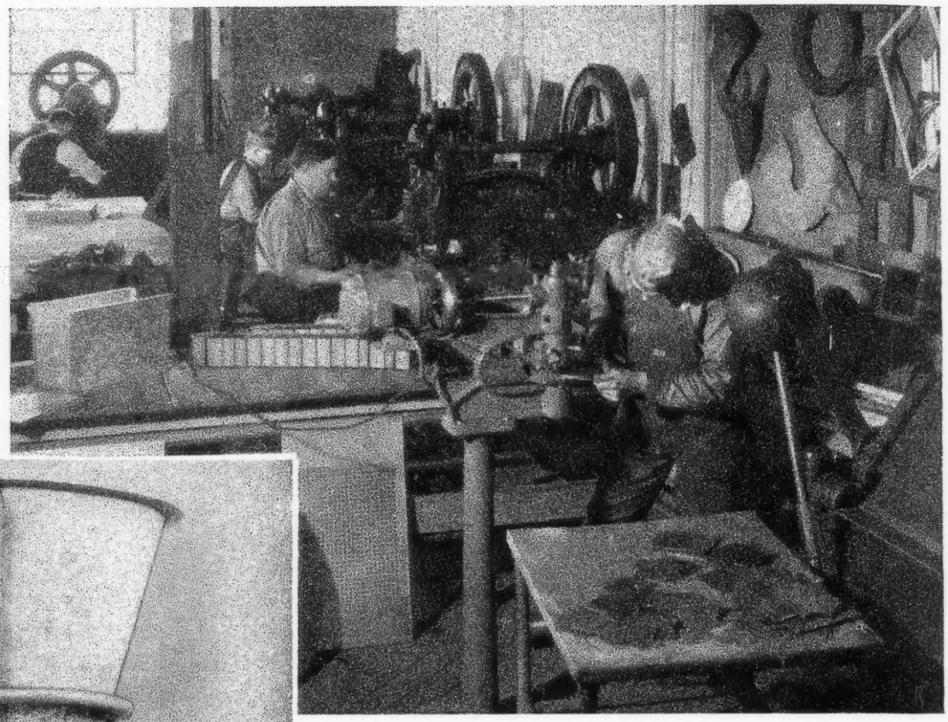

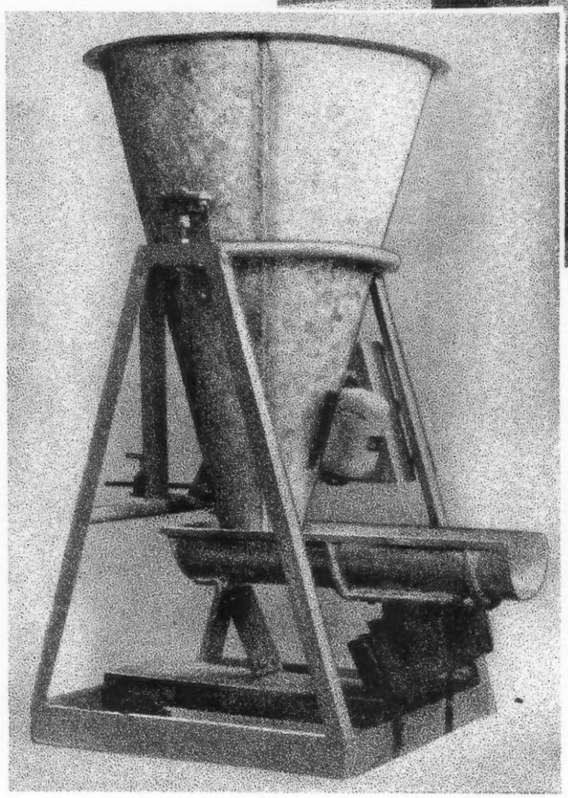

ABOVE

SYNTRON Pulsating Feeder Conveyor will feed small parts such as bolts, nuts, etc., as well as granular material on the level, downgrade and upgrade to as much as 20 deg. Pulsations are electromagnetic. (Syntron Co.)

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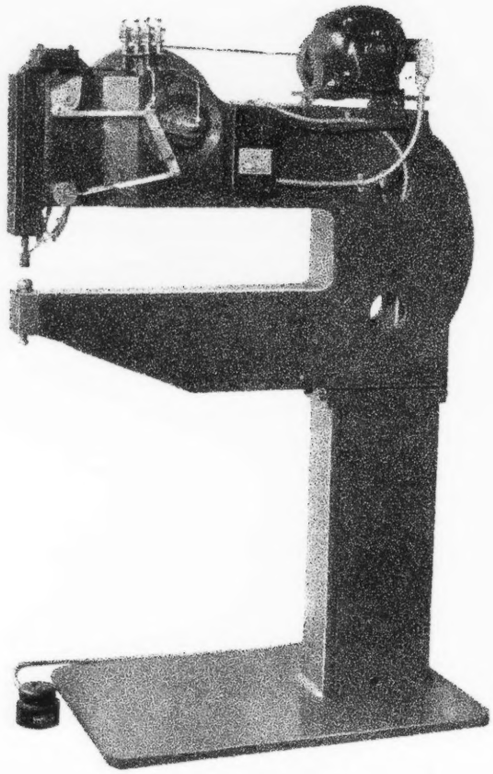
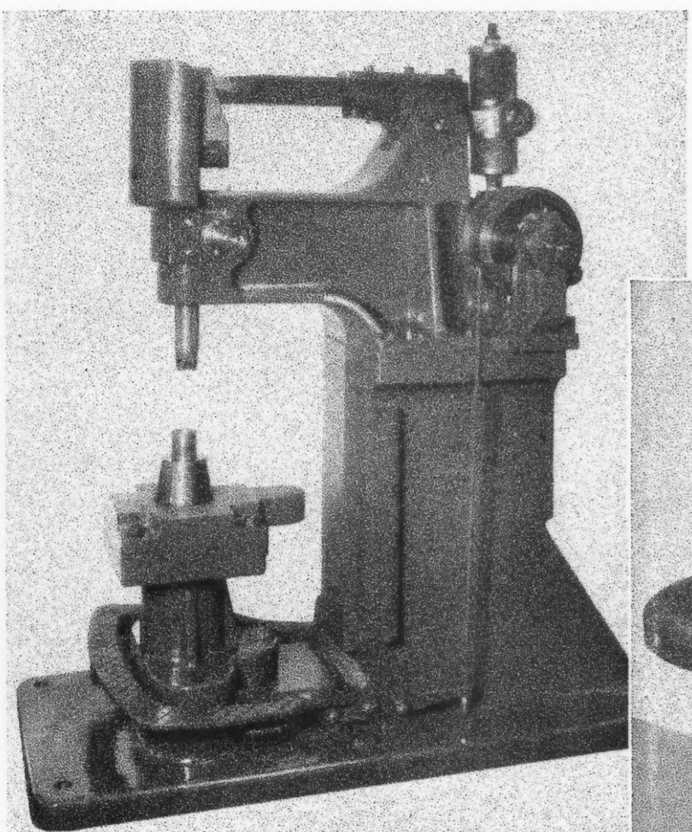


AT RIGHT

TOMKINS-JOHNSON 30-in. Throat "Rivitor" employs a solenoid trip which makes it possible to place foot control anywhere it is wanted. Machine will set 1/4-in. solid rivets. (Tomkins-Johnson Co.)

o o o

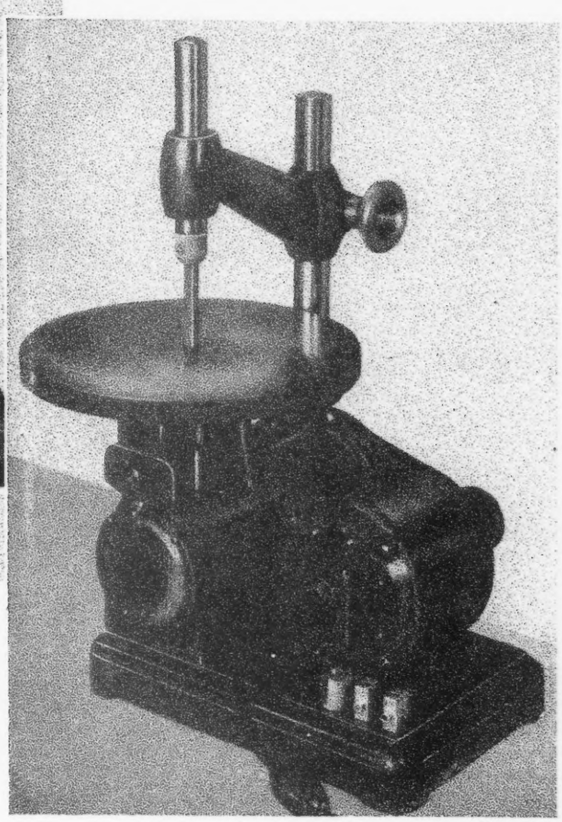
FIRST AIDS TO PRODUCTION



ABOVE

HIGH Speed No. 7-B Riveting Hammer is designed to cold-head 1½-in. mild steel rivets to oval heads in 30 sec. each and ¾-in. rivets in 7 sec. each. In the case of riveting flanges much larger diameters can be handled. Weight, 5000 lb. (High Speed Hammer Co., Inc.)

o o o



BELOW

ILLINOIS Die Filing Machine weighs 125 lb. and has a 12-in. diameter table tiltable to 20 deg. in two directions. Holds any size or type of file that can be held in a ½-in. chuck. (Illinois Tool Works.)

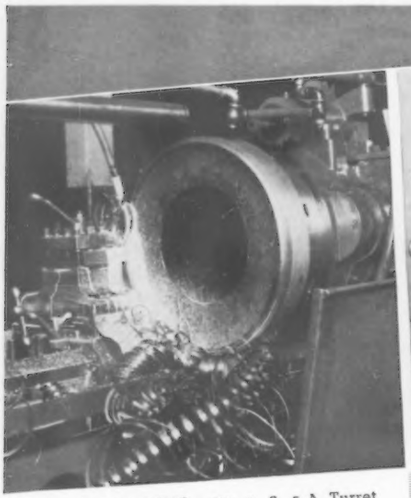
(CONTINUED FROM PAGE 235)

that are standard in tool rooms everywhere for sharpening steel and Stellite tools and cutters were entirely unsuited to this new material. It was soon apparent that to be able to grind it properly and economically, that is, without cracking or checking and in reasonable time, required unusually close fitting of the abrasive, bond and wheel structure or grain spacing to the material—virtually a custom-made, single purpose grinding wheel. However, the grinding wheel industry proved itself equal to the task and after exhaustive research and experimentation succeeded in developing wheels that met these exacting requirements.

To describe these new wheels briefly, they are made with either the common black silicon carbide abrasive or a new characteristically green-colored variety and are quite soft in grade to insure a continuously free and cool cutting action to prevent cracking from otherwise localized heating. At the same time they have sufficient strength or hardness to prevent their breaking down too rapidly and making it difficult to hold size or shape. The amount of abrasive and the spacing of the grains within the wheel are both controlled to a remarkably accurate degree and are adjusted to meet the conditions and requirements of the individual tool. Grade or hardness, which has a distinct bearing on the production per wheel, is held to much closer limits than are required in other types of grinding wheels.

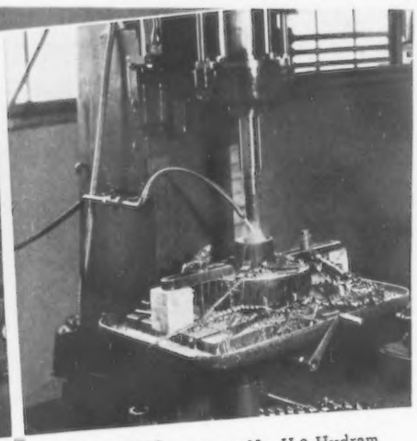
Today silicon carbide wheels made to these extremely accurate specifications are widely used for the grinding of tungsten and tantalum carbide tools. Their success-

(CONTINUED ON PAGE 252)



LATHE WORK. W. & S. 5-A Turret Lathe. Courtesy Warner & Swasey Co., Cleveland.

GRINDING. Pratt & Whitney 10 in. Helical Gear Grinder. Courtesy Buck & Hickman, Ltd., London, Eng.



DRILLING. Barnes No. H-2 Hydram Self-Oiling Driller. Courtesy Barnes Drill Co., Rockford, Ill.

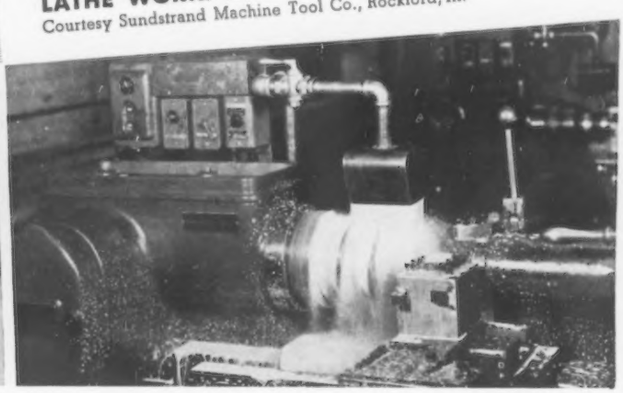
Sunoco "has what it takes" to aid machine tools give rated output

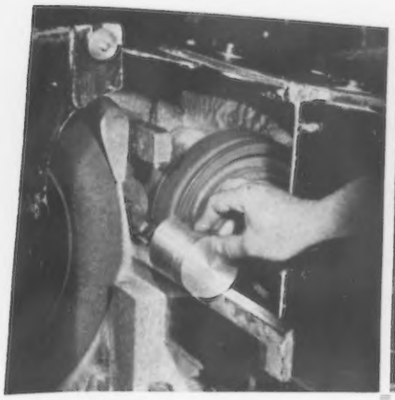
OUTSTANDING PERFORMANCE—OVER MANY YEARS. Check the records of machine tool manufacturers or leading metal cutting plants. You'll find Sunoco on the job . . . chosen for difficult, exacting work. Talk to executives, superintendents, operators . . . you'll learn Sunoco wins preference because it definitely aids in securing rated machine tool capacity.

GREATER ACCURACY, EVEN AT HIGH SPEEDS. Sunoco properly lubricates cutting tools, reduces frictional heat; lessens time lost from too-frequent sharpenings. Deeper and faster cuts are made possible—with precision maintained and quality finish assured.

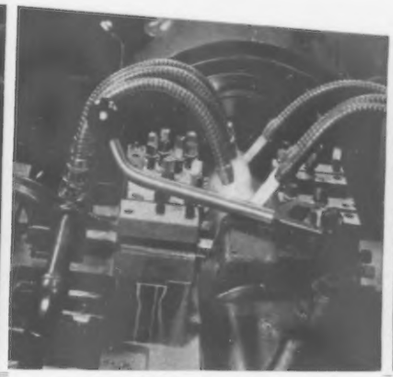
GRINDING. Brown & Sharpe No. 2 Universal Grinder. Courtesy Buck & Hickman, Ltd., London, Eng.

LATHE WORK. Sundstrand 10 in. Automatic Stub Lathe. Courtesy Sundstrand Machine Tool Co., Rockford, Ill.





GRINDING. Cincinnati No. 2 Centerless Grinder. Courtesy Cincinnati Milling Machine & Cincinnati Grinders, Inc.



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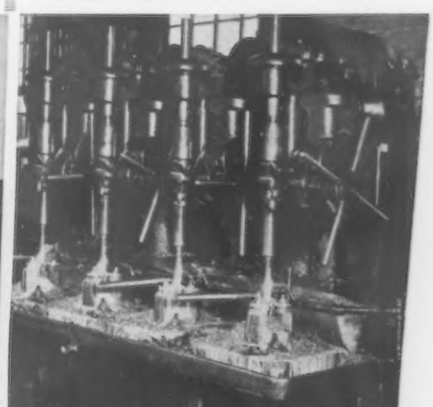

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W. F. McCARTHY

DEALER selling is as old as the industry and quite as unique in the commercial world. In general, we are such an integral part of this industry that the names; dealers and machine tools, have become almost synonymous. I am sure numerous dealers, who have been for years identified with specific lines, could give many examples of customers frequently requesting quotations on various types of machines without reference to maker's name, but with full confidence that the right make of machine would be quoted.

I do not know a representative manufacturer who, in his early days, did not depend upon some dealer to introduce his product. Several such companies could be cited as having been represented by the same dealer for long periods; in some cases continuously for more than 50 years. Others, when they have grown to a size sufficient to support a sales organization, have found it in their interest to sell direct. Some years ago, especially during the war and the immediate prosperous years following, there was a pronounced movement toward direct selling, but in the more recent lean years the pendulum seems to be swinging the other way, as many representative companies have returned to dealers, to the extent that probably more than 75 per cent of the builders now depend on dealers for distribution. This is not strange once it is appreciated that the dealer contributes much beyond the actual machine sale. He is obliged to maintain a large sales organization in a compact territory. When sales personnel is properly selected and assigned, it assures more frequent contacts than are possible economically with a single line of tools. Intimate relations and business confidences are the direct result. Such relations are not common where the direct representative is compelled to travel a wider area with a limited line.

There are, quite naturally, two definite schools of thought on dealer versus direct selling. The cost of selling is one point on which there is no agreement. Cost varies with sales volume, also with the method of accounting employed. The manufacturer who sells direct can exercise much latitude in fixing his selling cost, while the dealer must maintain his organization on his sales commission or go out of business. Thus actual costs are kept within definite bounds. The manufacturer who employs dealer distribution, when properly represented, is relieved of many sales responsibilities, including the very important and sometimes expensive factors of credit and financing. He receives his payments when they are due regardless of when the customer pays. He is free to devote his time and energy to the manufacturing problems of his business. These, in the present state of the art, are real problems. When an inquiry develops in a given territory, he is assured that the inquiry will have prompt attention and at no additional cost to him. The advantage of such attention to the buyer as well is obvious. Local representation insures better credit judgment than can be expected of the manufacturer who contacts only infrequently at times when his particular type of machine is under consideration. The dealer on the other hand, because of his various lines, has a running experience to guide him.

During the last decade our Association, through its officers, has devoted much time in striving to improve methods, and particularly the ethics, of dealer selling. Those of us who have interested ourselves in this work are gratified with the cooperative results attained. These improvements are reflected in better business methods, due in part to a better trained personnel with a keener appreciation of responsibilities, and with a more technical knowledge of what they are selling than was possessed prior to these improved conditions. Today salesmen are qualified to and do advance to our manufacturers and customers many ideas that lead to major improvements over the years—special tooling, machine design, new ways of doing a job, and even new jobs to be worked out when the customer's confidence is such that he feels free to disclose his future plans in gaining the assistance he knows can be expected when a detailed study of his requirements is made by the salesman who is out to serve.

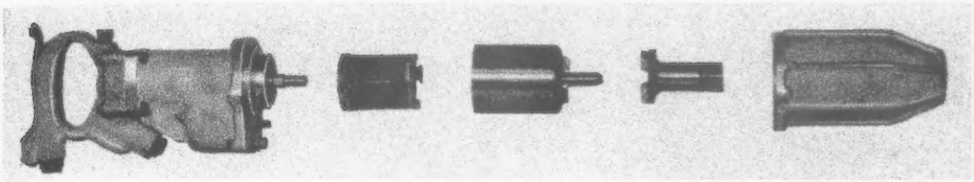
Dealer selling has another distinct virtue—it is a time saver for the busy executive. The late J. A. Smith, superintendent of the General Electric Co., once publicly stated, in effect, that if it is necessary to deal with direct factory representation through individuals on a matter of five or six separate tools, it might take nearly all day to interview the five or six representatives, whereas it would be an easy matter to sit down with a well-informed dealer salesman and close the whole job out within a half hour.

In conclusion, it is my firm conviction, based on 35 years of experience in dealer selling, that this is the most efficient and economical selling method for marketing machine tools.

Intimate acquaintance with the customer as developed by this method is of great importance to all concerned. We know their circumstances and their requirements and we have the facilities for serving them.

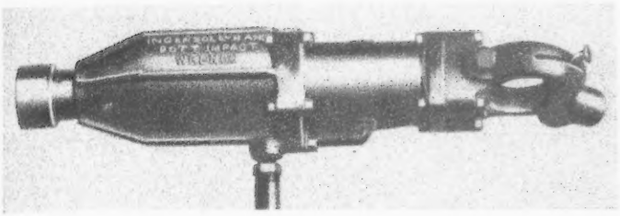
This prompts my final observation that the dealer is rendering a real service to the metal-working industry and to society as well. And I hope one day to see our dealer efforts given even greater recognition both materially and in its spirit of presentation.

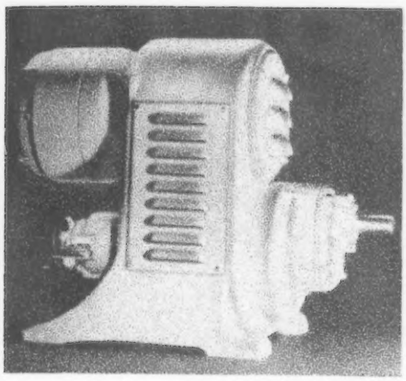
FIRST AIDS TO PRODUCTION



AT LEFT

INGERSOLL-RAND Pott Impact Wrench is a new type of wrench which operates on impact. It is now furnished reversible for removing as well as applying nuts. Another new feature is air-cooling of the accumulator, which prevents overheating. (Ingersoll-Rand Co.)





ABOVE

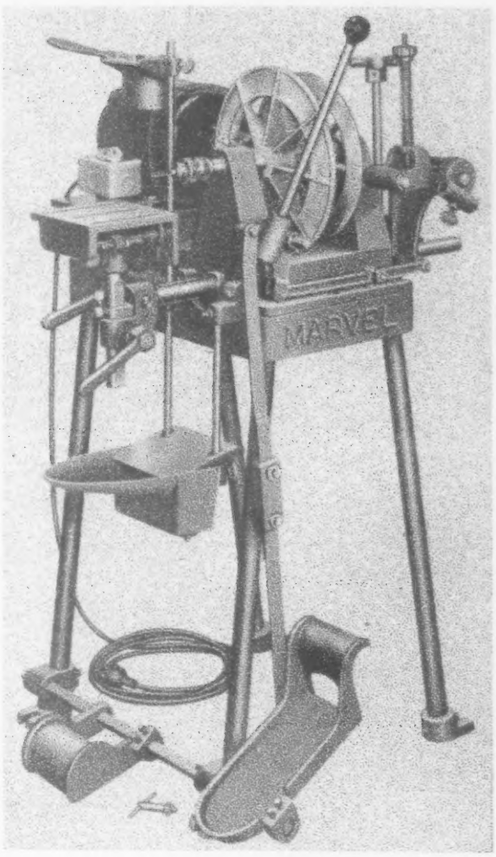
U. S. Electrical Motors has produced this new design VariDrive in the upright style, providing material space saving. Take-off shaft can be had in either high or low position. (U. S. Electrical Motors, Inc.)

o o o

AT RIGHT

ARMSTRONG-Blum Marvel Horizontal Friction Tapping - Threading Machines are produced in a line of seven sizes having capacity from No. 0 taps up to 1/2 in. U.S.S. in steel. There is a spring return table on all models with fine screw adjustment for depth stop. (Armstrong - Blum Mfg. Co.)

o o o

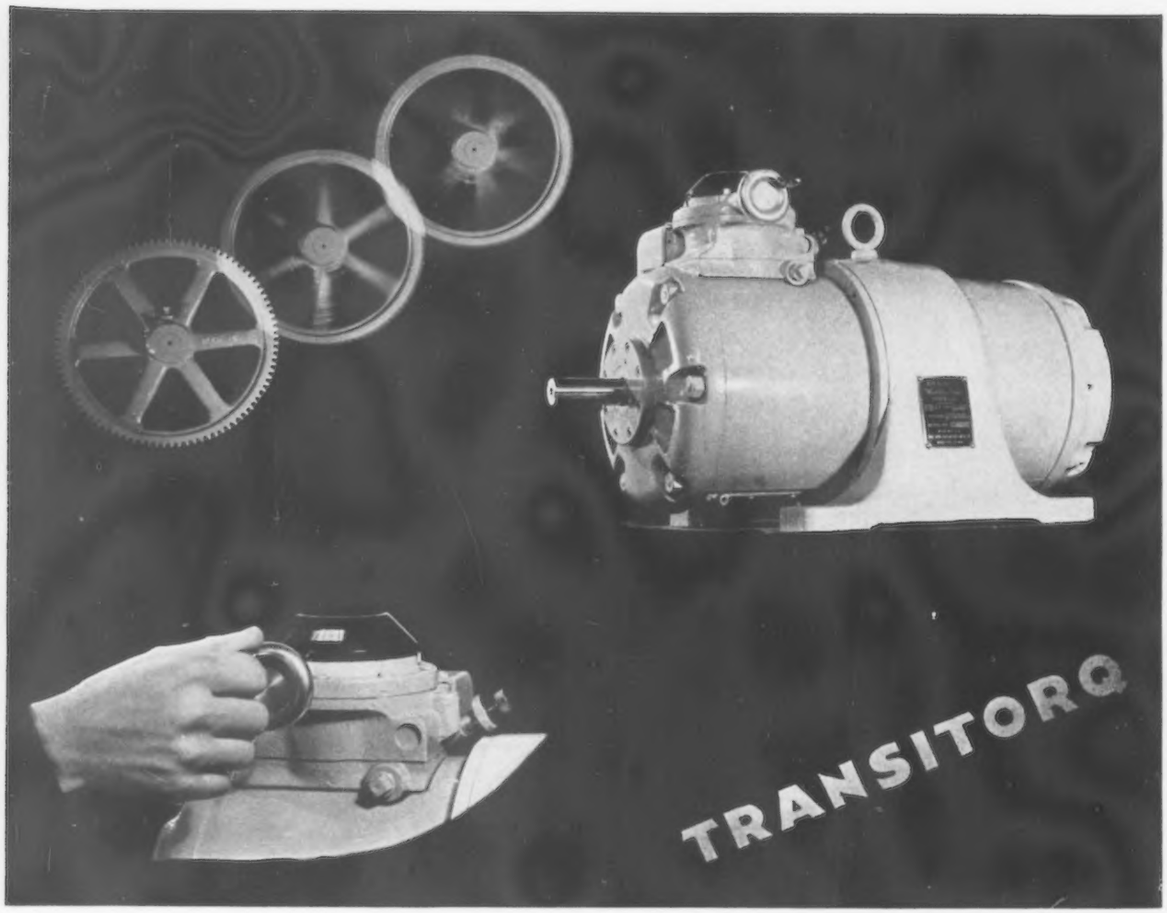


New Abrasives and Grinding Wheels for New Cutting Tools

THE remarkable developments in alloy steel and cemented carbide cutting tools within the past six years have been matched by equally remarkable developments in abrasives and grinding wheels used for fashioning and sharpening these new high-production tools.

The cutting carbides, in particular, furnish an outstanding example of the resourcefulness and capacity for research to be found within the grinding wheel industry. When cemented tungsten carbide (and later cemented tantalum carbide) was first introduced to American industry a few years ago, grinding wheel manufacturers were called upon to produce suitable wheels for grinding this sensationally hard and durable material. Here was a new cutting tool, without the least resemblance in composition and physical characteristics to the familiar high-speed steel and Stellite. The "red" and "white" aluminum oxide wheels

(CONTINUED ON PAGE 241)



THOUSANDS OF SPEEDS . . .

at the touch of a finger

NOW, for the first time, *infinite* speed change becomes available at the touch of a finger — the flash of a light — or the passing of time.

Not only is the Transitorq a transmission whose speed is *infinitely adjustable* over a wide range — but its marvelous ease of speed control — immediate or remote, manual or automatic — presages a revolutionary advancement in increased production and lower costs in every industry.

A positive drive under all conditions. Desired speed may be selected before starting or changed by fingertip control while running.

Automatically returns to low-speed, high-torque starting position whenever stopped. Accelerating time to preselected speed is adjustable.

Built as a compact unit with any make of motor. Adaptable to any mounting position —vertical or horizontal, sidewall or floor.

Catalog PI upon request. The New Departure Mfg. Co., Bristol, Conn., a division of General Motors.

NEW DEPARTURE *Variable Speed* TRANSITORQ

TOOL DESIGN ★ ★ ★ ★ ★

THESE MANUFACTURERS WILL HAVE G-E EQUIPPED MACHINES AT THE SHOW

Booth No.	NORTH EXHIBIT HALL
1	Charles H. Besly & Co.
3	O. S. Walker Co., Inc.
13	The Ohio Machine Co.
14	The Hall Planetary Co.
15	Charles G. Allen Co.
19	W. B. Knight Machinery Co.
20	The Cleveland Automatic Machine Co.
23-A	National Machinery Co.
24	The Thompson Grinder Co.
25	The Bridgeport Safety Emery Wheel Co.
27	Brown & Sharpe Mfg. Co.
	ARCADE
C	Reed-Prentice Corp.
D	The Lapointe Machine Tool Co.
E	Gould & Eberhardt
H	H. Geo. Gorton Machine Co.
	NEW NORTH ANNEX
101	Norton Company
103	The Geometric Tool Co.
106	Racine Tool & Machine Co.
108	The Arter Grinding Machine Co.
109A	Acme Machine Tool Co.
110	Giddings & Lewis Machine Tool Co.
111	Buffalo Forge Co.
112	Gisholt Machine Co.
200	Foster Machine Co.
201	Barnes Drill Co.
202	The Lucas Machine Tool Co.
203	Bryant Chucking Grinder Co.
204	Landis Machine Co.
205	Bullard Co.
206	The Heald Machine Co.
207	Cincinnati Milling Machine Co.
208	Oliver Instrument Co.
305	The Fellows Gear Shaper Co.
306	Sundstrand Machine Tool Co.
307	Gallmeyer & Livingston Co.
307A	The Producto Machine Co.
307B	Baker Bros., Inc.
307C	Porter Cable Machine Co.
309	Blanchard Machine Co.
400	Kearney & Trecker Corp.
401	William Sellers & Co., Inc.
402	The Hendey Machine Co.
403	Leland-Gifford Co.
404	The Hanson-Whitney Machine Co.
405	The Abrasive Machine Tool Co.
406	The Cincinnati Bickford Tool Co.
601	The National Acme Co.
602	Potter & Johnston Machine Co.
603	The Cincinnati Shaper Co.
604	The Taylor & Fenn Co.
607	Jones & Lamson Machine Co.
800	Springfield Machine Tool Co.
810	Ingersoll Milling Machine Co.
811	Gleason Works
813	The Monarch Machine Tool Co.
900	Eastern Machine Screw Corp.
901	The American Tool Works Co.
903	Barber-Colman Co.
904	The Carlton Machine Tool Co.
905	Warner & Swasey Co.
906	Pratt & Whitney Co.
909	The New Britain-Gridley Mach. Co.
912	The Foote Burt Co.
913	Van Norman Machine Tool Co.
914	Seneca Falls Machine Co.
1001	The R. K. LeBlond Machine Tool Co.
1006	Davenport Machine Tool Co.
1008	The Goss & deLeeuw Machine Co.
1009	Kingsbury Machine Tool Corp.
1010	Rivett Lathe & Grinder, Inc.
1012	The G. A. Gray Co.
	Accessories Section
	EXHIBITION HALL
E-203	The Chas. L. Jarvis Co.
E-206	General Electric Co.
E-210	Colt's Patent Fire Arms Mfg. Co.
E-302	Link-Belt Co.
E-308	Henry & Wright Mfg. Co.
E-309	Toledo Scale Co.
E-314	The Rotor Air Tool Co.
E-315	The V & O Press Co.
E-406	The New Departure Mfg. Co.
	ARENA
A-209	The Leon J. Barrett Co.
A-301	The Producto Machine Co.

011-73

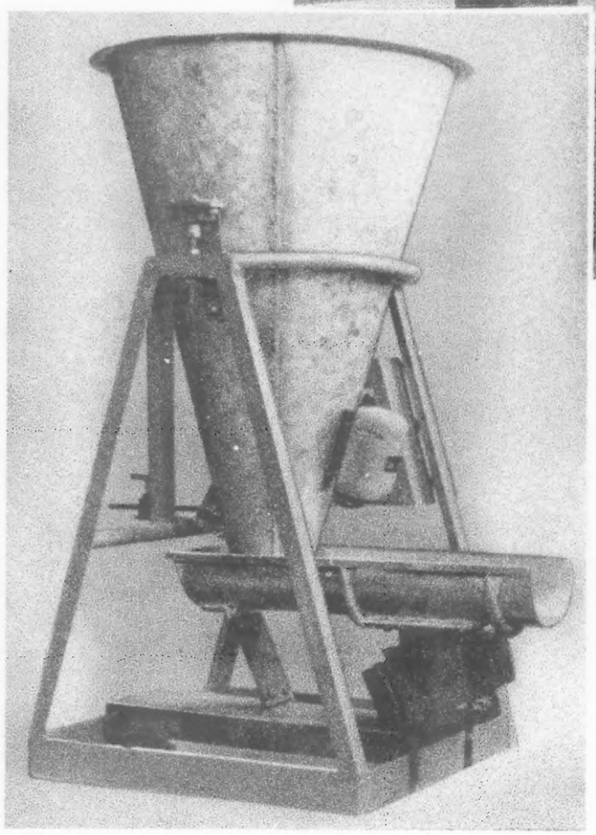
ELECTRIC

o o o

AT RIGHT

SAVAGE Nibbling Machine No. 109, with throat depth of 9 in. and thickness capacity of 1/8 in. in mild steel, is a bench model machine now available for template cutting and line cutting. No secondary operations are required. (W. J. Savage Co.)

o o o



ABOVE

SYNTRON Pulsating Feeder Conveyor will feed small parts such as bolts, nuts, etc., as well as granular material on the level, downgrade and upgrade to as much as 20 deg. Pulsations are electromagnetic. (Syntron Co.)

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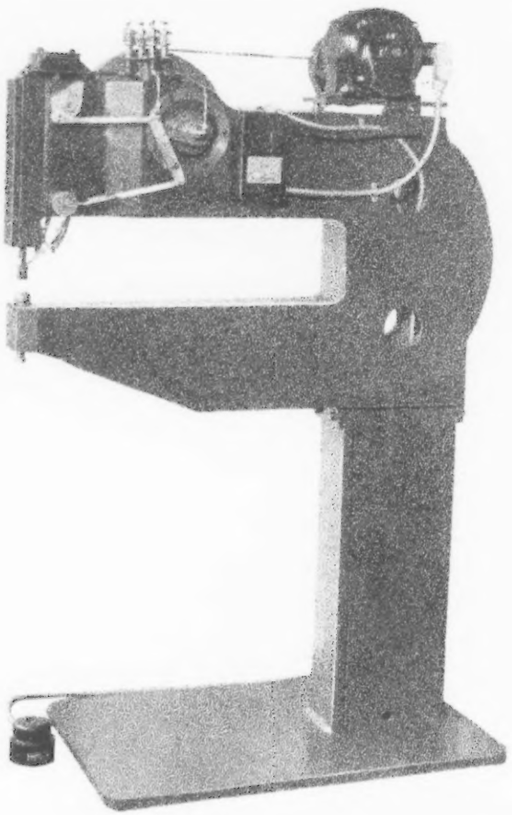
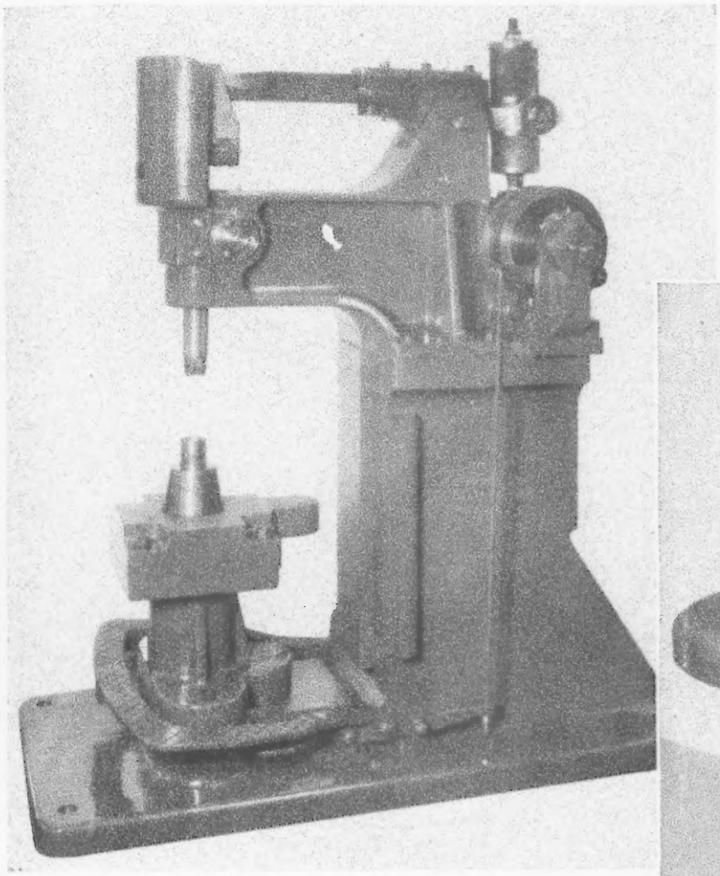


AT RIGHT

TOMKINS-JOHNSON 30-in. Throat "Rivitor" employs a solenoid trip which makes it possible to place foot control anywhere it is wanted. Machine will set 1/4-in. solid rivets. (Tomkins-Johnson Co.)

o o o

FIRST AIDS TO PRODUCTION



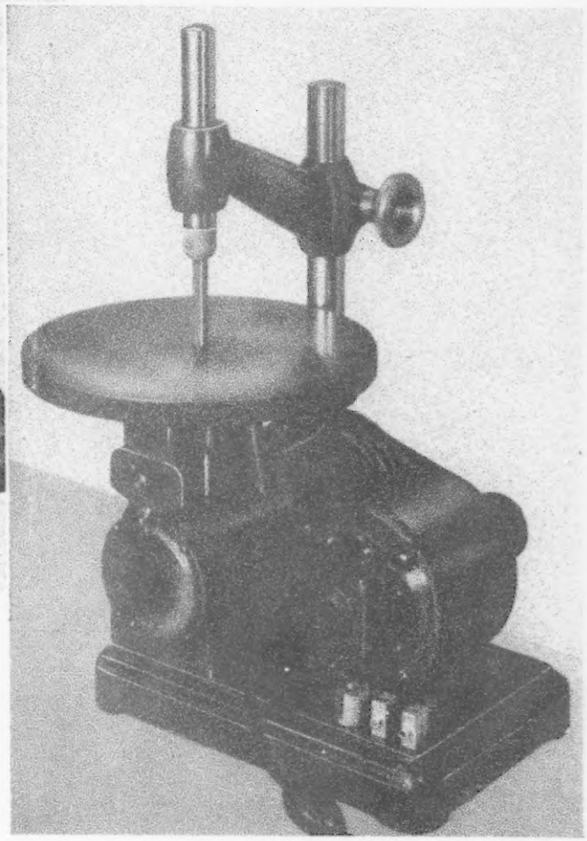
ABOVE

HIGH Speed No. 7-B Riveting Hammer is designed to cold-head 1½-in. mild steel rivets to oval heads in 30 sec. each and ¾-in. rivets in 7 sec. each. In the case of riveting flanges much larger diameters can be handled. Weight, 5000 lb. (High Speed Hammer Co., Inc.)

o o o

BELOW

ILLINOIS Die Filing Machine weighs 125 lb. and has a 12-in. diameter table tiltable to 20 deg. in two directions. Holds any size or type of file that can be held in a ½-in. chuck. (Illinois Tool Works.)



(CONTINUED FROM PAGE 235)

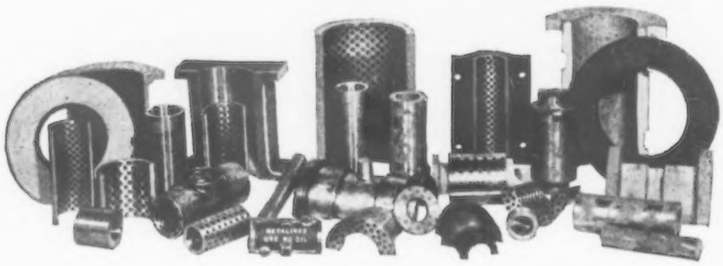
that are standard in tool rooms everywhere for sharpening steel and Stellite tools and cutters were entirely unsuited to this new material. It was soon apparent that to be able to grind it properly and economically, that is, without cracking or checking and in reasonable time, required unusually close fitting of the abrasive, bond and wheel structure or grain spacing to the material—virtually a custom-made, single purpose grinding wheel. However, the grinding wheel industry proved itself equal to the task and after exhaustive research and experimentation succeeded in developing wheels that met these exacting requirements.

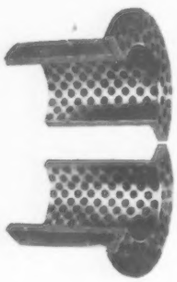
To describe these new wheels briefly, they are made with either the common black silicon carbide abrasive or a new characteristically green-colored variety and are quite soft in grade to insure a continuously free and cool cutting action to prevent cracking from otherwise localized heating. At the same time they have sufficient strength or hardness to prevent their breaking down too rapidly and making it difficult to hold size or shape. The amount of abrasive and the spacing of the grains within the wheel are both controlled to a remarkably accurate degree and are adjusted to meet the conditions and requirements of the individual tool. Grade or hardness, which has a distinct bearing on the production per wheel, is held to much closer limits than are required in other types of grinding wheels.

Today silicon carbide wheels made to these extremely accurate specifications are widely used for the grinding of tungsten and tantalum carbide tools. Their success-

(CONTINUED ON PAGE 252)

METALINE OILLESS BEARINGS





This group of bearings illustrates but a few of the many types we make for the various trades. It also serves to show the wide range and countless irregular shapes we can supply. Metaline Oilless Bearings can be made to fit your present housings.

OILLESS BEARINGS THAT REQUIRE NO ATTENTION

In line with the modern trend it is important that bearings once installed operate for a long time before being renewed. Metaline in addition to meeting this problem will work satisfactorily at high temperatures where other bearings fail.

R. W. RHOADES METALINE CO., Inc.

LONG ISLAND CITY, N. Y.

PRECISION BEARINGS
in 108 distinct series

To the machinery world, NORMA-HOFFMANN offers the most complete and comprehensive line of anti-friction bearings in America—108 distinct series—a PRECISION Bearing for every load, speed and duty.

Many of these have been pioneered, or specially developed, by NORMA-HOFFMANN engineers to meet specific requirements as revealed by advancing methods in machine design, manufacture and operation.

In times past, engineers often had to adapt their designs to the comparatively few standard bearing types then available. Today—with the wide range of types and sizes afforded by the standard NORMA-HOFFMANN PRECISION line, such compromise is seldom necessary.

In the 108 PRECISION Series are included: ball, roller, needle and thrust bearings; open, closed, and angular contact bearings; radial and self-aligning types; single and double row types; felt-protected, shielded, snap ring and self-sealed types. The size range is from 1/8- to 21-inch bore, embracing both metric and inch sizes. PRECISION Ball and Roller Bearing Pillow Blocks are also available in an extensive range of sizes.

Write for the Catalog. Let our engineers work with yours.

"NORMA-HOFFMANN"

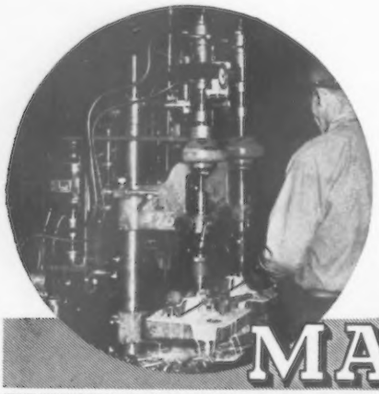
PRECISION BEARINGS

BALL. ROLLER AND THRUST

Booth A-401, National Machine Tool Exposition.

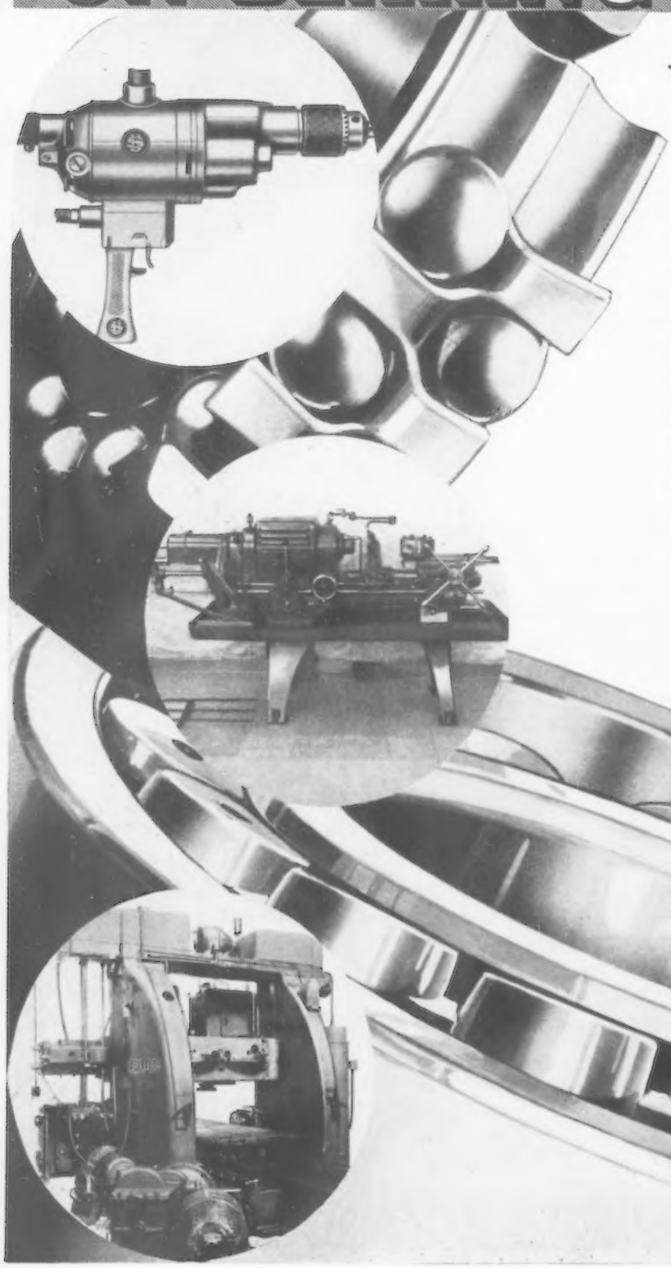
NORMA-HOFFMANN BEARINGS CORPN., STAMFORD, CONN. U.S.A.

A-3127



SPECIFY SKF for Machine Tools and Shop Equipment.

MACHINE TOOL PERFORMANCE DEPENDS ON BEARING ACCURACY



WHEN it's a precision job, it's a job for SKF accuracy. And, obviously, every machine tool job is a precision job. Check up on that statement yourself. You'll find SKF's in grinders, drills, lathes, in all kinds of machine tools.

Yet precision . . . the ability to insure perfect rigidity at all speeds . . . is merely one of SKF's many advantages. For SKF's meet heavy strains and stresses imposed on spindles, speed mechanisms and gears. They avoid chatter, maintain alignment, and keep going smoothly at all times.

Good bearings and good machines always keep company. And though there are many good bearings, there's only one SKF.

SKF INDUSTRIES, INC., Front St. & Erie Ave., Phila., Pa.

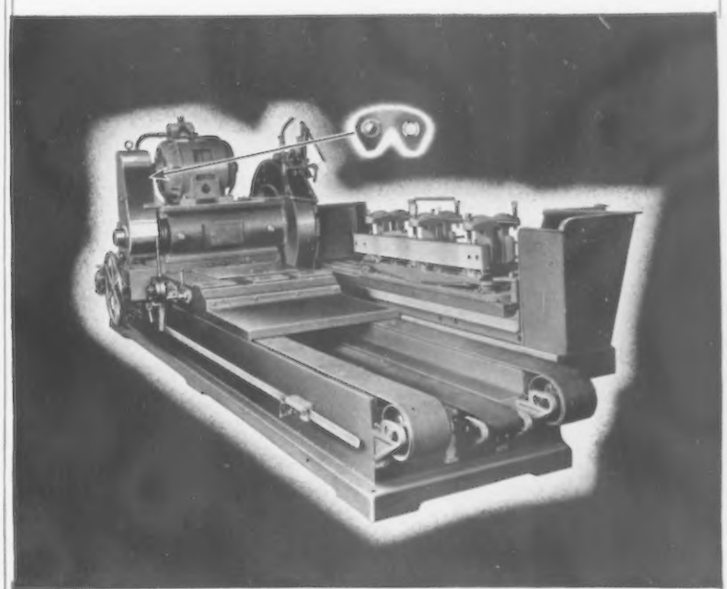
SKF

BALL AND ROLLER BEARINGS

3455

HANCHETT MANUFACTURING CO.

Another one of the many famous builders of American machine tools using the Silent Chain Drive.



SILENT CHAIN EQUIPPED

DURABLE
EFFICIENT
EASILY APPLIED

SILENT

LINK-BELT

5384

LINK-BELT COMPANY

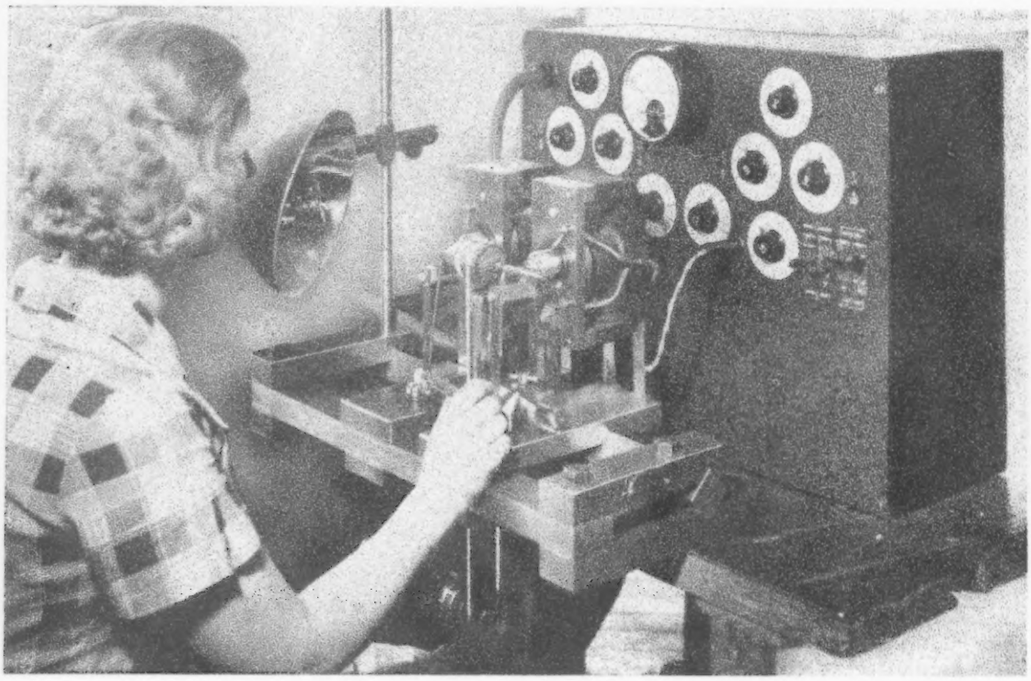
The Leading Manufacturer of Positive Power Transmitting Equipment

INDIANAPOLIS CHICAGO PHILADELPHIA ATLANTA SAN FRANCISCO TORONTO

Offices in Principal Cities

SEE OUR EXHIBIT AT THE MACHINE TOOL SHOW — SPACE E-302 — CLEVELAND, SEPTEMBER 11-21

FIRST AIDS TO PRODUCTION



AT LEFT

WESTINGHOUSE Electro-Dynamic Balancer is a new production tool for balancing rotating parts. The point of unbalance is made visible at any speed, and amount is indicated on a calibrated meter. Made for all sized rotors up to 125 tons and as small as 1¼-in. diameter. (Westinghouse Electric & Mfg. Co.)

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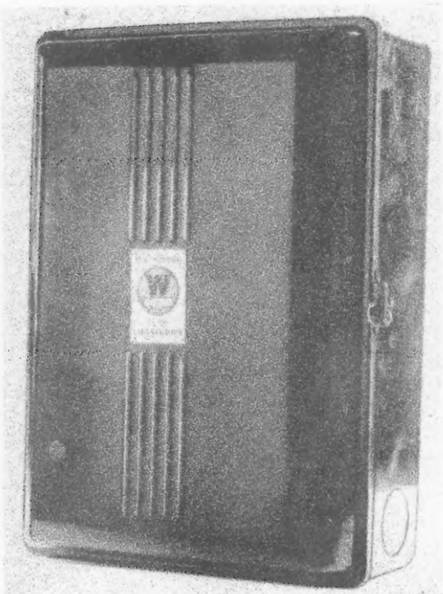
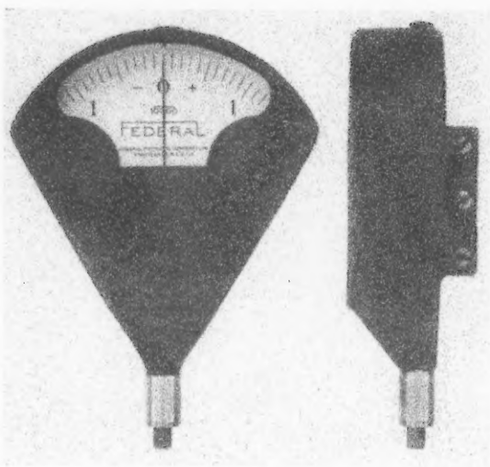


ABOVE

WESTINGHOUSE 100-150 Ampere De-Ion Contactors have high rupturing capacity permitting long life under repeated operation. Suitable for built-in use. (Westinghouse Electric & Mfg. Co.)

o o o



ABOVE

FEDERAL Model 866 Clear Vision Indicator is an especially accurate 0.0001-in. indicator so designed that the dial is quickly spotted by the inspector without eye wandering. Graduations on the dial are 0.097 in. apart. Another model, No. 95 (not shown), has graduations 0.200 in. apart. (Federal Products Corpn.)

o o o

ELWELL-PARKER *Customers:* COME TO THE SHOW

with your mind set on new economies in Handling Materials

Visit the Machine Tool Show by all means; profit by this vast contribution of engineering knowledge and manufacturing craftsmanship.

But look first to your own methods of transporting materials; make sure that the money you save by modern production actually will go into dividends —won't be swallowed up again by excessive load-handling costs.

Begin your latest cost-reductions as you did when you bought your *first* Elwell-Parkers. Install *New* Elwell-Parker Fork Trucks to pick up, transport, stack, tier and deliver loads to boxcar or motor truck.

Move goods in greatest volume; keep aisles clear; relieve "bottle-necks." Carry larger loads per trip—in standard Unit Containers, mounted on light, inexpensive wooden pallets, and *kept* on pallets to destination.

Before you come to Cleveland, please write, outlining your shop conditions. Elwell-Parker Engineers will be ready with recommendations. Visit our Booth, or come to the Office and Plant. Or, we will send an Engineer for a survey *before* the Show. You are entitled to his services without obligation.

If you're not an Elwell-Parker user, come join the family! Write for "This New Industrial Pick-up," 32 pages brimful of helpful ideas. The Elwell-Parker Electric Company, 4225 St. Clair Ave., Cleveland, O.

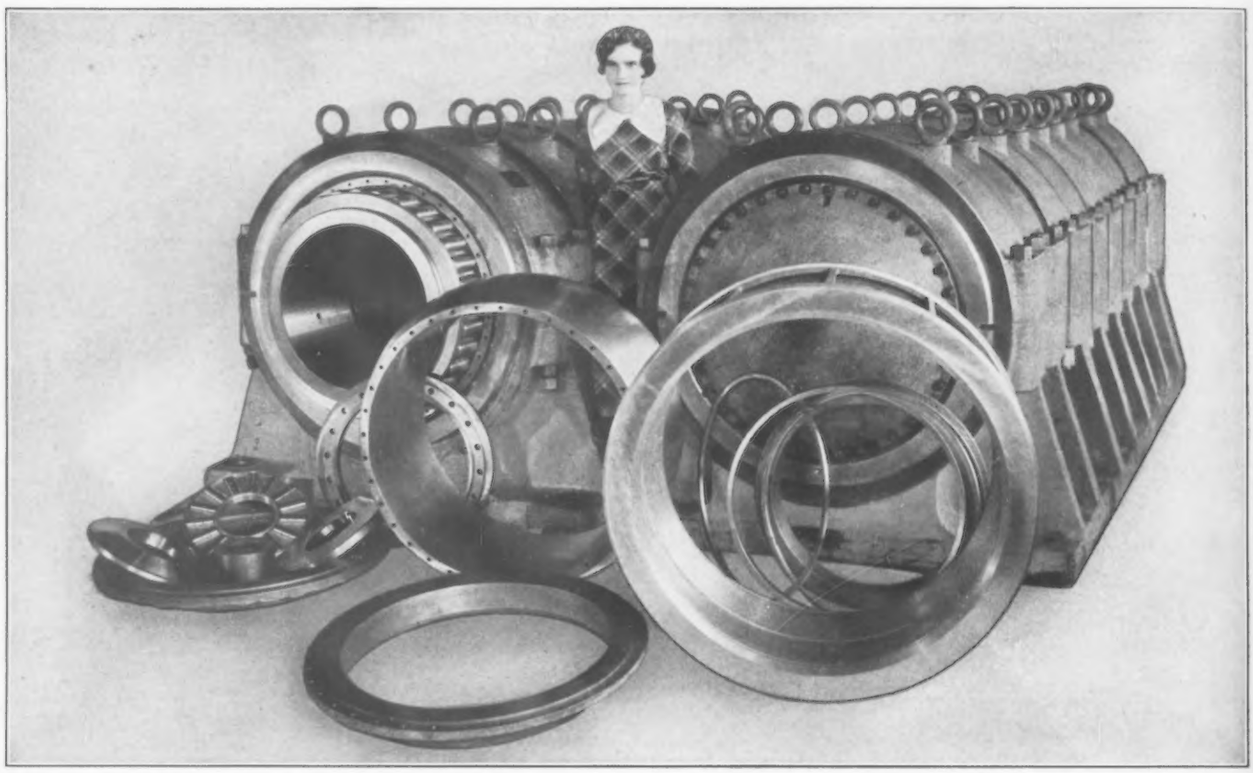
COME TO OUR BOOTH: VISIT OUR PLANT WHILE IN CLEVELAND

New **ELWELL·PARKER** *Fork trucks*

ESTABLISHED 1893 • BUILDING POWER INDUSTRIAL TRUCKS SINCE 1906

BANTAM

BEARINGS FOR THE WORLD'S LARGEST RAILWAY LIFT BRIDGE



Sixteen Bantam Roller Bearing Pillow Blocks 22″ I.D. by 52½″ high with a base 5 ft. long support the 8 main sheaves 16 feet in diameter by 31″ wide which lift the moveable span of the new Cape Cod Canal railway bridge.

The moveable span is 544 ft. long, weighs 4,160,000 pounds and is the largest of its type in the world.

Bantam Roller Bearing Pillow Blocks were selected for this service on the basis of their outstanding performance record on heavy duty service throughout industry.

Take your Toughest Bearing job to Bantam

Send for general Bantam catalog on Ball and Roller Bearings.

Trade Mark Reg. U.S. Pat. Off.

BBB

THE BANTAM BALL BEARING CO.

SOUTH BEND, INDIANA

CHICAGO · PHILADELPHIA · YOUNGSTOWN · PITTSBURGH · DETROIT · ROCHESTER, N. Y. · DALLAS · SEATTLE · NEW YORK · TOLEDO · NEW ORLEANS · WASHINGTON, D.C.

ONE OR A HUNDRED MILLION • 1/32″ TO 60″

And now-
FOR THE MOST MODERN

IN ROLLED STEEL CONSTRUCTION
★
DESIGN
★
SAVINGS
★
SET-UP
★

SEND FOR -
"WELDING FOR THE MECHANICAL INDUSTRIES"

DANLY MACHINE SPECIALTIES, Inc.,
2128 So. 52nd Ave., Chicago, Illinois
Send me the 12 page book—free — "Welding For the Mechanical Industries"—describing the advantages of Danly-Smith Welding.
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FIRM NAME.....
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CITY.....STATE.....

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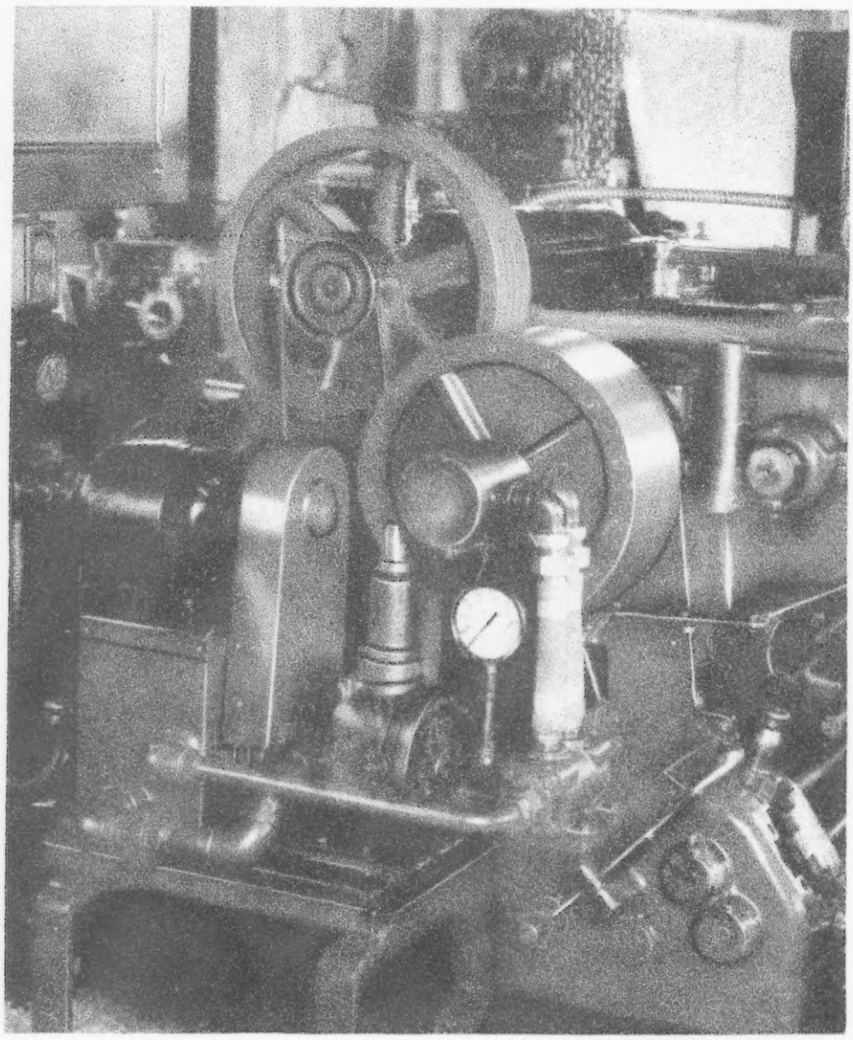
2128 So. 52nd Ave., Chicago, Illinois

DANLY SMITH WELDING



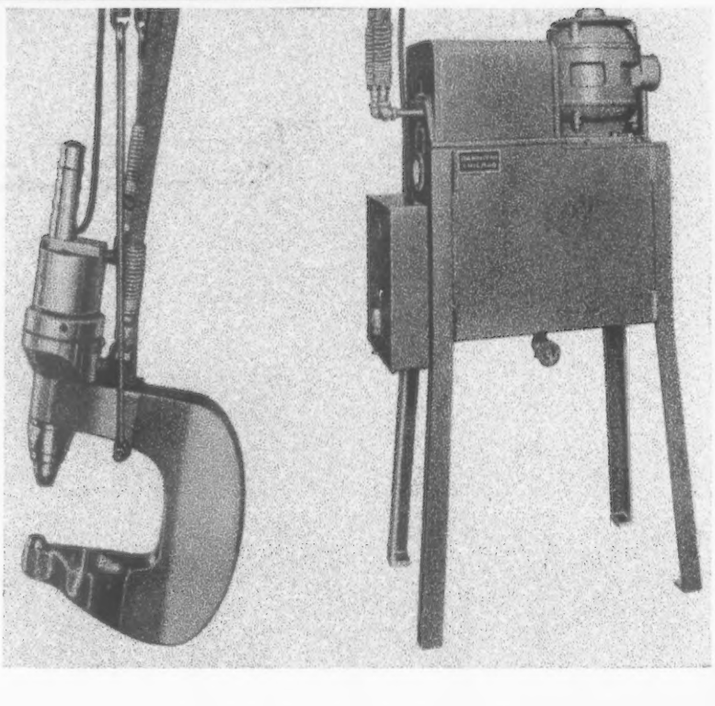
AT LEFT

TOMKINS - JOHNSON Electric-Hydraulic Chuck Operating Unit is designed and built for use on machines requiring a single-unit chuck operating mechanism. By-passing of oil has been eliminated, thus avoiding oil heating. Working pressure up to 250 lb. per square inch. (Tomkins-Johnson Co.)

o o o

BELOW

HANNIFIN Yoke Type Hydraulic Press and hydraulic pressure generator constitute a new type of hydraulic riveting machine. The yoke press weighs but 54 lb., develops a maximum pressure of 35,000 lb., has a 6 by 6-in. throat and will head 3/8-in. iron rivets cold. (Hannifin Mfg. Co.)

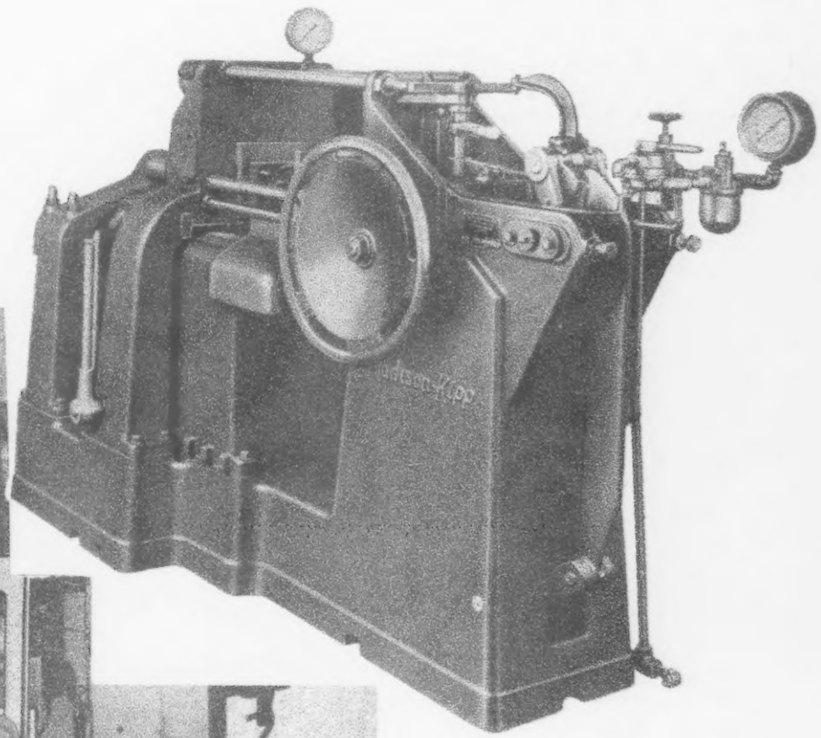


(CONTINUED FROM PAGE 241)

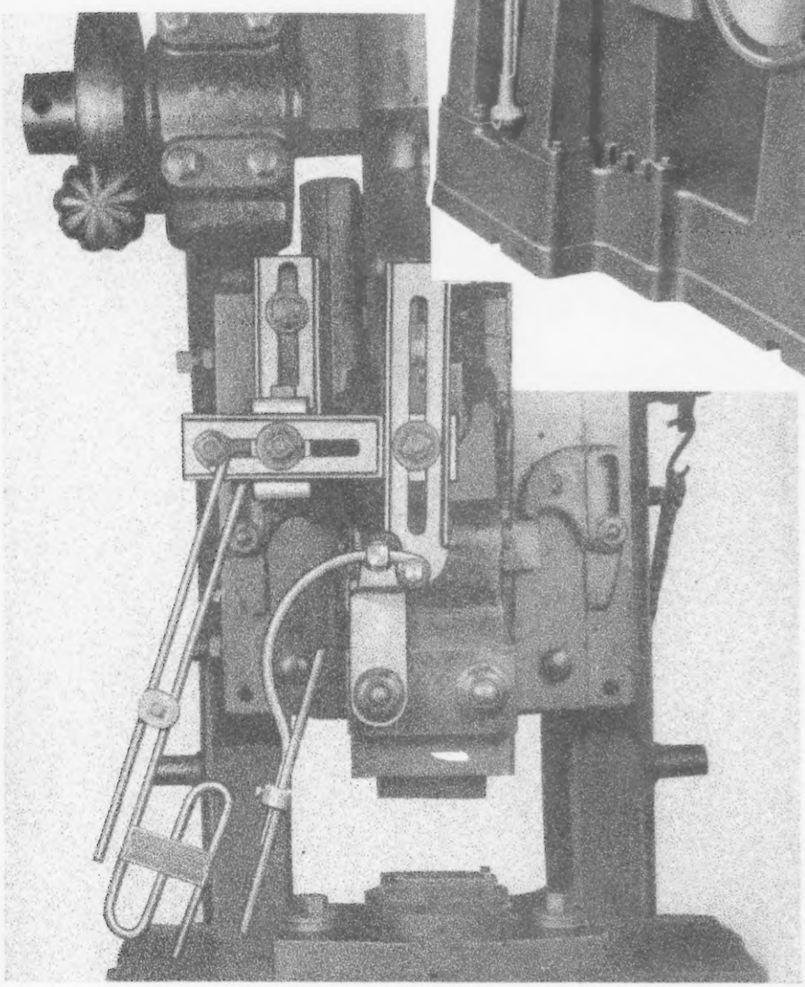
ful use depends on an accurate selection of soft wheel specifications and adherence to specialized grinding methods. It may be said that these wheel specifications and grinding methods furnish a compromise between high rate of wheel wear and dulled wheel face. An excessively dulled wheel face results in localized heating and loss of costly tool material by cracking. The real need was for an abrasive still harder than silicon carbide. Grinding wheel manufacturers found the solution in the hardest known substance, the diamond.

As used for grinding wheels, the diamond is the industrial variety known as bort. While not desirable for gems, its hardness makes it

MADISON-KIPP Model 6 Die Casting Machine is a new design intermediate in size between the Kippcaster and the Madison-Kipp Automatics. Handles all of the standard casting alloys in zinc, aluminum, lead or tin. Air pressure gooseneck is standard equipment. Pot capacity, 300 lb. (Madison-Kipp Corpn.)



JOHNSON Punch Press Safety Guards are of both the stationary and the sweep type. The stationary guard, shown at the left in the illustration, prevents the operator from working in back of the sweep guard. Adaptable to presses having 1½ to 8-in. stroke. (E. P. Johnson Rule Mfg. Co.)



particularly suitable as an abrasive.

The first grinding wheels in which bort or crushed diamonds were successfully used as the abrasive were produced several years ago by the Norton Co. They were small internal wheels, no larger than ¼ in. and ⅜ in. in diameter, and developed specially for grinding cemented carbide wire-drawing dies.

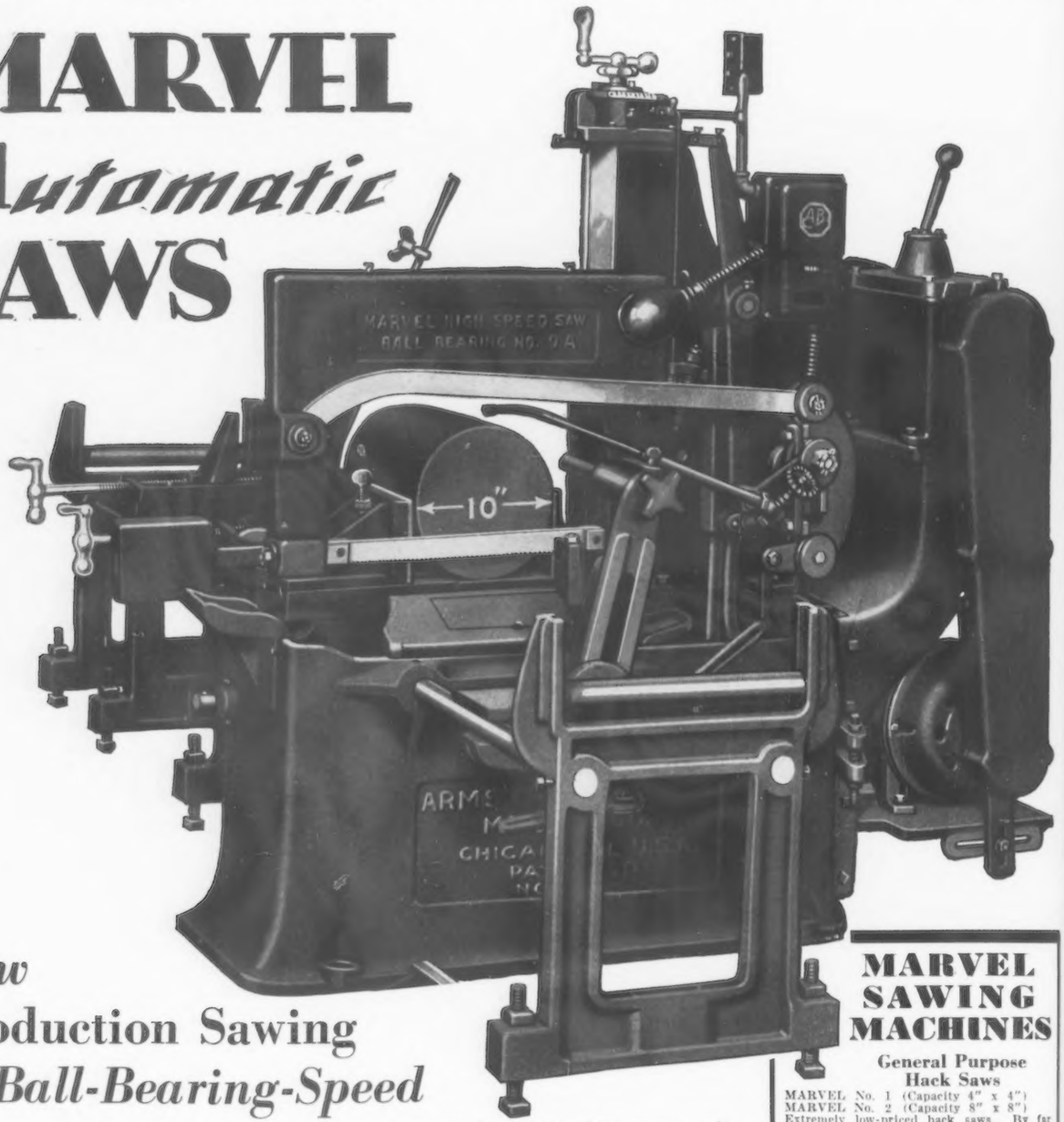
Then followed in quick succession straight wheels for producing sharp corners on cemented carbide-tipped tools of special shapes such as are used in screw-machine work, and cup-shaped wheels for lapping small cemented carbide-tipped tools and for grinding the clearance on reamers, surface broaches and milling cutters tipped with cemented carbide. One of the more recent applications of diamond wheels is in cut-off wheels 1/32 in. thick for cutting through sections of hard carbide rapidly and with low wheel wear. They are much faster than steel or copper disks charged with diamond dust and more economical when properly applied.

There are numerous advantages to using diamond wheels for grinding and lapping cemented carbide

(CONTINUED ON PAGE 266)

Outstanding Among Machine Tool Achievements

MARVEL *Automatic* SAWS



Now Production Sawing *at Ball-Bearing-Speed*

Here is a new thing in *production* machine tools that ends the cutting-off problem . . . Automatic Sawing Machines with the weight and stamina for continuous high-speed operation . . . with ball bearing construction throughout — ball bearing crank shaft, ball bearing blade-frame, ball bearing transmission, ball bearing connecting rods, etc.

Fully Automatic (with automatic bar push-up), require no more operator attention than does an automatic screw machine. Combination (dual) positive—and—friction power screw feeds; direct connected without belts or clutches; quick blade return (shaper ram action); convenient hand screw feed; capable of applying feed loads as high as 1000 pounds (made practical by use of Non-Breakable MARVEL High-Speed-Edge Hack Saw Blades); and many other features of modern development. No wonder these super-sawing machines speed up production, cut costs, increase profits.

For the cutting-off of solid bar stock (gear blanks, for example), no other sawing or lathe cutting-off equipment can even approach the hourly production, the low production cost, and the extremely high efficiency of these new improved MARVEL Ball Bearing Production Machines. They will produce 10 pieces 6″ round steel, or 160 pieces 1½″ round (other sizes in proportion) every hour FLOOR-TO-FLOOR with no attention from the operator, at an almost negligible cost per piece.

See our private, independent operating exhibit at 634 St. Clair Ave., Cleveland, Ohio, Sept. 10th to 25th (just a few steps from the Cleveland Auditorium); or at the National Metal Exposition of the American Society for Metals, International Amphitheatre, Chicago, Sept. 30th to Oct. 4th; or write for bulletin No. 600.

MARVEL SAWING MACHINES

General Purpose Hack Saws

MARVEL No. 1 (Capacity 4″ x 4″)
MARVEL No. 2 (Capacity 8″ x 8″)
Extremely low-priced hack saws. By far the most widely used small hack saws.

Light Duty High Speed Saw

MARVEL No. 4B (Capacity 6″ x 6″)
Moderate-duty, general-purpose high speed saw that will out-cut all others in its price class.

Heavy-Duty High Speed Saws

MARVEL No. 6 (Capacity 6″ x 6″)
MARVEL No. 9 (Capacity 10″ x 10″)

Automatic Production Saws

MARVEL No. 6A (Capacity 6″ x 6″)
MARVEL No. 9A (Capacity 10″ x 10″)

A New 18″ Marvel Hack Saw

MARVEL No. 18 (Capacity 18″ x 18″)
A new model to be announced and shown for the first time at the National Metal Exposition, Chicago, Sept. 30th. Embodies entirely new principle of blade action, low-pressure hydraulic feed and quick traverse. An extremely heavy "giant" hack saw, about 5000 lbs. net weight, for extremely large and heavy work.

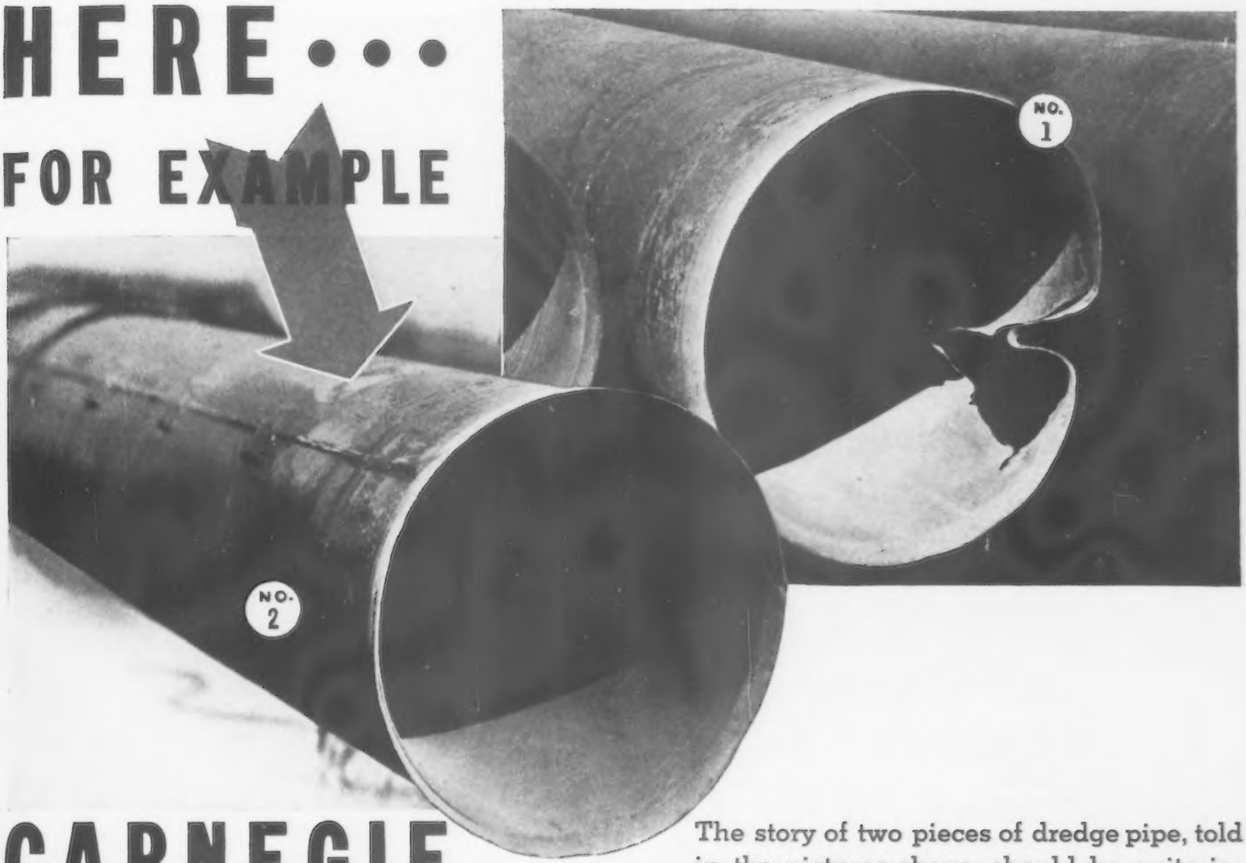
Metal-Cutting Band Saw

MARVEL No. 8 (Capacity 18″ x 18″)
The most universal saw built.
Handles any type of cut, large or small, with equal facility.

No tool-room is well equipped without one of these "new 1935 model" MARVEL Metal Band Sawing Machines

ARMSTRONG-BLUM MFG. CO.
"The Hack Saw People"
349 N. Francisco Ave., CHICAGO, U. S. A.

HERE • • •
FOR EXAMPLE



CARNEGIE ★AR STEEL
proved its worth

★ ABRASION RESISTING

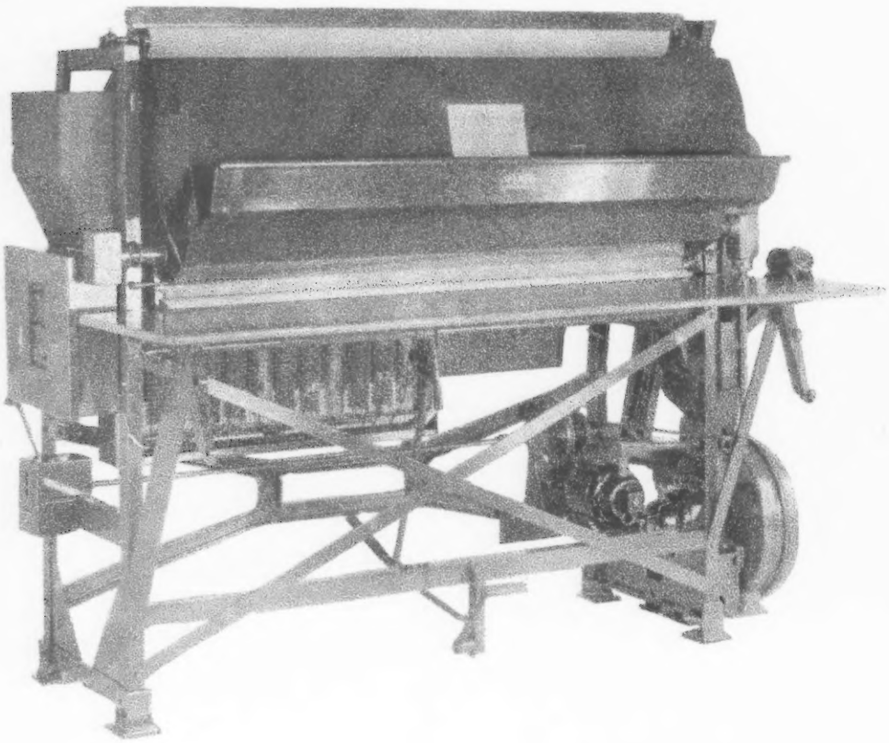
The story of two pieces of dredge pipe, told in the pictures above, should be quite interesting to those concerned with the problem of abrasion. Pipe No. 1, of ordinary steel, is unfit for further use after one year's service. Pipe No. 2, of Carnegie AR Steel, has also served for one year in the same installation, at the same time, under identical conditions. It should be noted that the supplementary band around the edge of pipe No. 2, worn to a feather edge, is made of ordinary steel. The user has expressed the opinion that the AR Steel pipe can be used for four or five more seasons. Naturally, Carnegie AR Steel has been specified on subsequent orders. • Results have been equally spectacular in a number of other applications. In conveyor plates, chute liners, coke screens, dragheads, hoppers, fan blades, brick and tile dies, bucket lips, dipper teeth, grinding mill plates, sand and gravel screens and a host of other uses, Carnegie AR Steel has convincingly demonstrated its worth. If abrasion is one of your problems, investigate the merits of Carnegie AR Steel.

CARNEGIE STEEL COMPANY • PITTSBURGH

Pacific Coast Representatives: **COLUMBIA STEEL COMPANY** • *San Francisco*

United States Steel U·S STEEL *Corporation Subsidiaries*

FIRST AIDS TO PRODUCTION



o o o

PEASE Model 11 Blue-Printing Machine is presented as a low first-cost machine which will produce first-class prints up to 12 ft. per min. at a low cost per square foot. Available in two sizes for paper and cloth up to 42 in. wide and up to 54 in. wide. (C. F. Pease Co.)

o o o

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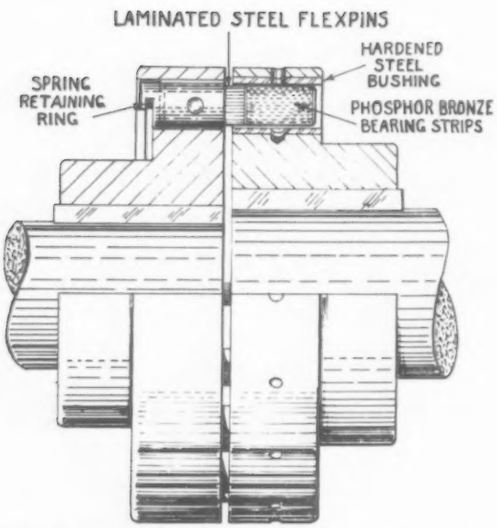
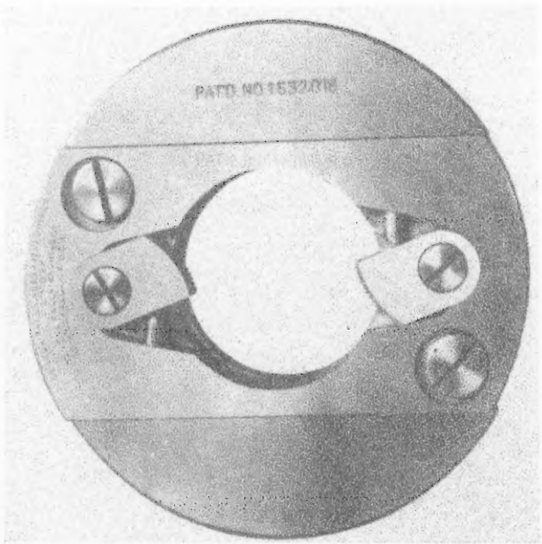


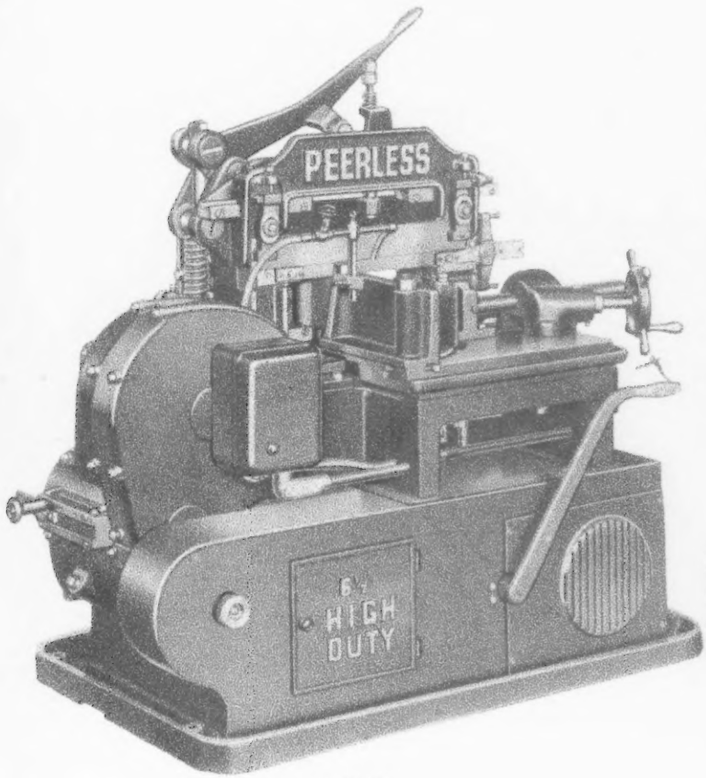
SMITH & SERRELL Flexpin Coupling has been redesigned with six important improvements. Hardened steel bushings (interchangeable with former ones) have been provided and laminations in pins are copper coated to resist rust. (Smith & Serrell.)



SENECA Falls Automatic Work Driver is designed to curtail dogging time so that one operator can run two or more machines. It is adapted for all makes of turning and grinding machinery. Can be supplied also for gripping tapers. (Seneca Falls Machine Co.)

o o o

FIRST AIDS TO PRODUCTION



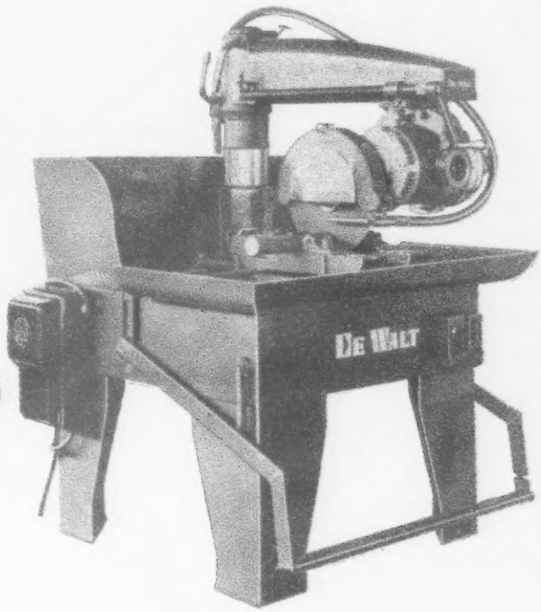
ABOVE

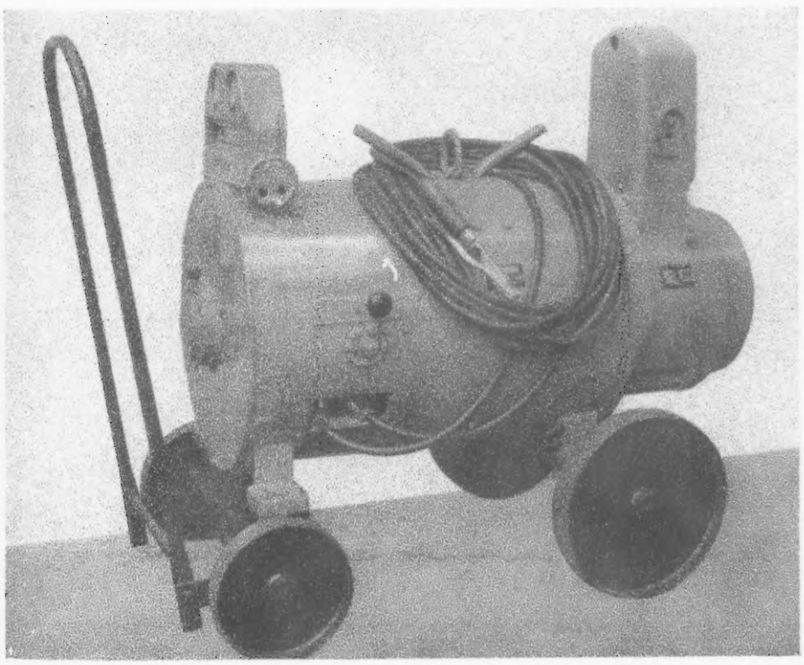
PEERLESS MACHINE CO's Power Hack Saw has been designed in 6½ in. by 6½-in. capacity. It is called the Peerless High Duty Metal Sawing Machine. Has a three-speed transmission with gears running in oil. Automatic bar feeding equipment is hydraulically operated. (Peerless Machine Co.)

o o o

BELOW

DE WALT Metal Cutting Machine utilizes the overhead principle cutting with abrasive wheel or saw blade directly driven by motor shaft or back gear. Built in several sizes up to 20 hp. (DeWalt Products Corpn.)





o o o

AT LEFT

HARNISCHFEGER 200-Ampere Heavy-Duty Welders are now produced with new oversize two-bearing armature shafts, removable ball bearing capsules, simplified current control, dustproof calibration plate, heavy-duty, built-in polarity switch and drip-proof housings. Also in 300 and 400 ampere sizes. (Harnischfeger Corpn.)

o o o

Announcing AN IMPROVED REAL HIGH DUT

PEERLESS

METAL SAWING MACHINE

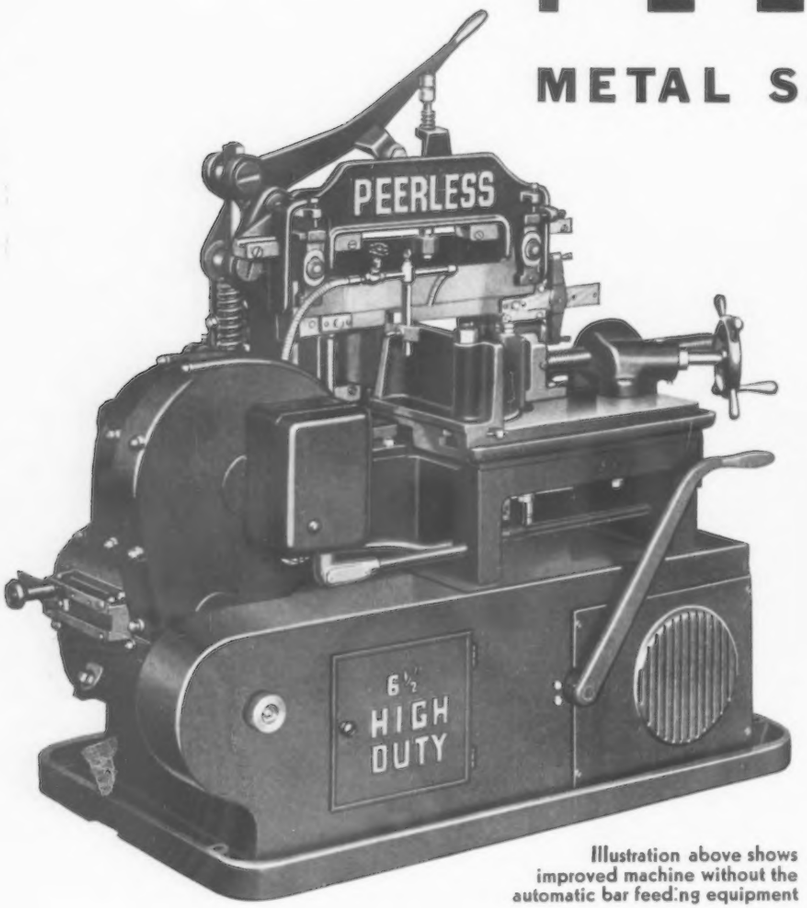


Illustration above shows improved machine without the automatic bar feeding equipment

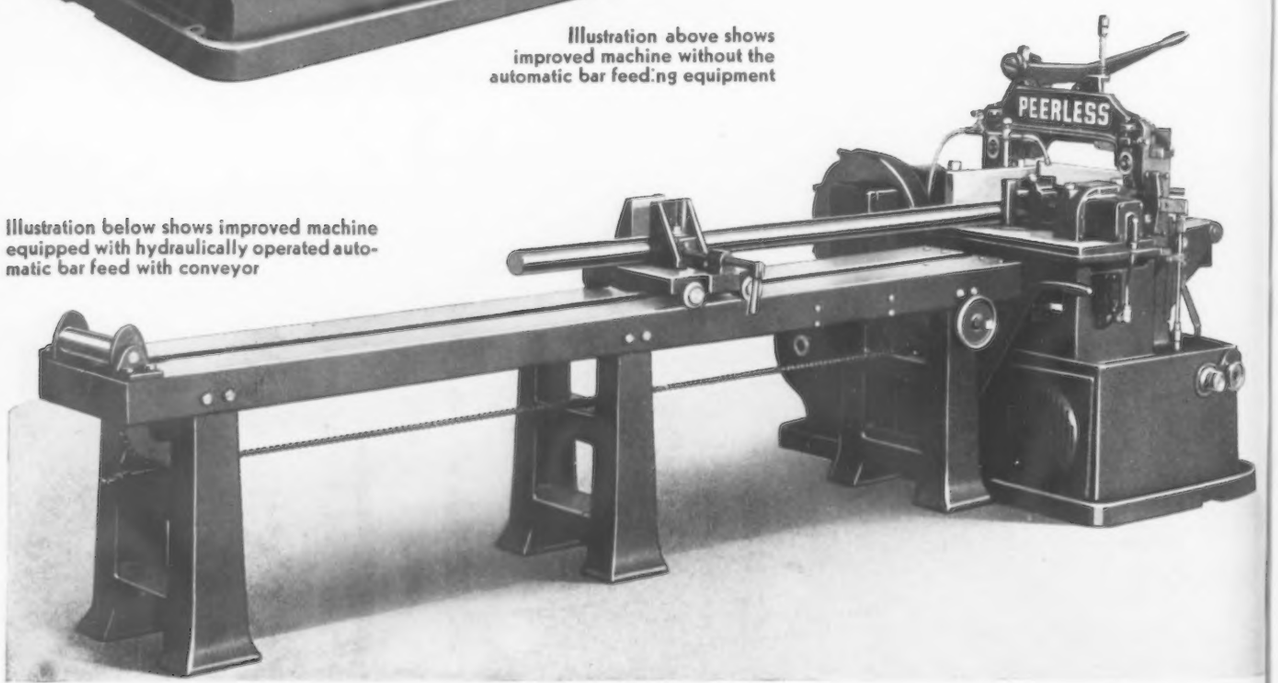
A Sturdy Machine Designed for Fast, Accurate Production Sawing . . .

AT THE SHOW

SPACE No. 4

6½" x 6½" Capacity

Illustration below shows improved machine equipped with hydraulically operated automatic bar feed with conveyor



PEERLESS MACHINE COMPANY • RACINE, WISCONSIN

AND

NOW!

FOR SETTING
CLINCH NUTS

THE "CLINCHOR"

● A new type of machine to automatically feed and set clinch nuts. It is controlled by a single foot pedal. A small cylinder coordinated with the clinching mechanism selects the nut and places it in a nest on the anvil. A new type of inclined drum hopper operated through a ratchet drive direct from the fly-wheel introduces a continuous agitation of the nuts and assures a positive feed of the nuts to the magazine.
● Write for a circular. An experienced engineering department is ever ready to work with you in applying the "Clinchor" method to your production.

THE TOMKINS-JOHNSON CO.
628 NORTH MECHANIC STREET
JACKSON, MICHIGAN

19 Reasons Why
Ruthman Gushers are preferred by most machine tool builders

Outside Mounted Type
Model 11022

1 HAVE LEAST NUMBER OF PARTS—Simplicity is the essence of Good design.

2 REQUIRE NO PRIMING—Much time is saved thereby each day.

3 HAVE NO PACKING NUTS—to leak, consume power or require adjustment.

4 NO FOOT VALVES NOR RELIEF VALVES—you save the cost of these parts.

5 NO METAL TO METAL CONTACT—makes possible continuous and dependable handling of non-lubricating liquids, such as lapping, honing, and grinding compounds, etc.

6 NOT INJURED BY SMALL CHIPS AND GRIT—strainers are not necessary.

7 CAN BE THROTTLED TO ANY EXTENT WITHOUT BUILDING-UP PRESSURE.

8 LESS POWER IS CONSUMED WHEN THROTTLED.

9 FULL BALL BEARING DESIGN MINIMIZES FRICTION.

10 LARGER BALL BEARINGS ARE USED—to insure more rigidity and longer life.

11 THE INNER RACEWAY, OF THE BEARINGS, ALONE REVOLVES—increasing the life of the bearings by 1.46.

12 NO DIRT IS CARRIED TO BEARINGS WHEN OILED BECAUSE THERE ARE NO OPEN pockets above them.

13 BUILT-IN CONDUIT BOX SIMPLIFIES WIRING AND INCREASES COMPACTNESS.

14 CUP DISC FAN PREVENTS ANY OIL OR DIRT FROM GETTING ON MOTOR WINDINGS.

15 BALANCED THRUST IS ACCOMPLISHED BY USING THE PUMPING ACTION AS A counterbalance.

16 COMPACT DESIGN enables installation in small space.

17 HAVE PATENTED FEATURES which are legally restricted to GUSHER pumps.

18 BUILT BY THE PIONEERS OF THE VERTICAL PACKLESS MOTOR PUMP.

19 GUARANTEED UNCONDITIONALLY FOR ONE FULL YEAR.

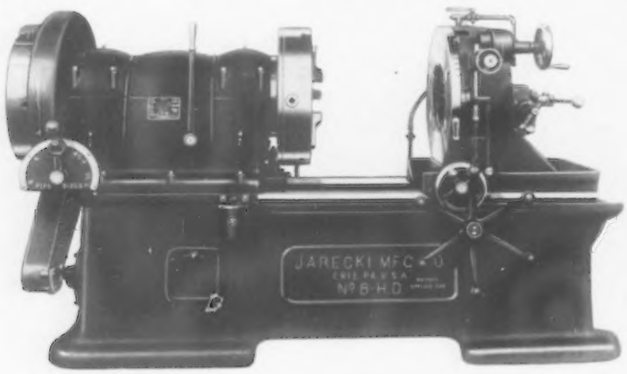
NOTE We are at your service, without obligation, for any suggestions or estimates on any coolant pump application for any type machine. Write us about your requirements, or ask for a copy of our complete catalog.

Immersion Type
Model 11021

THE RUTHMAN MACHINERY CO., Cincinnati, Ohio

A Single Glance at These FEATURES

Will Convince you that this is the
PIPE THREADING MACHINE
You've Been Looking for . . . . .



One automatic self-opening die head covers complete capacity range.

One set of H. S. S. chasers threads complete standard range—changeable only for thread or pitch variation.

Chasers are easily and quickly changed. Screw-driver only tool required.

Chasers held in massive holders—no bushings.

Die-opening trigger automatically opens chasers at correct thread length.

Cutting off and chamfering at same operation.

Gears are steel-cut, running in oil. Hardened chrome-nickel steel wearing parts.

TIMKEN ROLLER BEARING equipped.

Sturdy construction—exceptional reliability.

● Study the Jarecki Heavy-Duty, High-Speed Pipe Threading Machine for five minutes, and you'll agree that it represents not merely another machine—but a *fundamental development* in threading-machine design. Never before has any pipe threader presented so many important and unique features. In no other machine will be found such a perfect combination of speed, durability and economy. You will be interested in complete details. We shall be glad to forward them on request.

JARECKI MANUFACTURING CO. **ERIE, PA.**

JARECKI Pipe Threading Machines

A First Aid to Production for Half A Century!

MILWAUKEE WROT WASHERS

Known to INDUSTRY as

The Most Complete and Varied Line in America

- WASHERS
- DISCS
- BLANKS
- MACHINERY BUSHINGS
- EXPANSION PLUGS
- SHIMS
- COLLARS
- RIVETING WASHERS (RIVET BURRS)

SPECIAL WASHERS TO INDIVIDUAL ORDER

Unlimited Facilities For
The Production Of

STAMPINGS - TOOLS - DIES
SPECIAL MACHINERY
EXPERIMENTAL and ENGINEERING DEVELOPMENT

"The World's Largest Producer of Washers"

WROUGHT WASHER MFG. CO.
2202 SOUTH BAY ST.
MILWAUKEE, WIS., U. S. A.

NEW!

This Comprehensive Engineering Handbook and Reference Manual

for

- **PURCHASING**
- **ENGINEERING**
- **PRODUCTION**

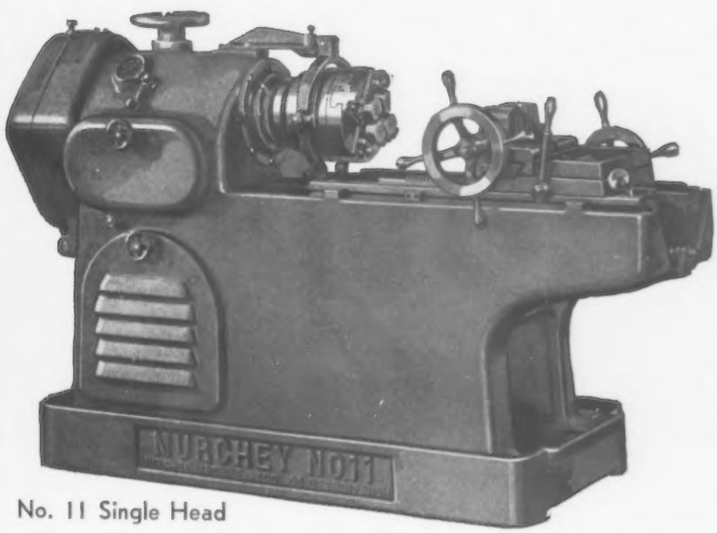
Departments

"SPECIAL WASHERS AND STAMPINGS"
(TOOL and DIE LIST No. 10)

Listing over 19,000 sets of tools for producing washers and stampings used in the design and production of almost every type of fabricated product made today.

Sent FREE to responsible firms upon request

Modernization in Threading!



No. 11 Single Head

Threading, the modern way, accurately, quickly and conveniently will be demonstrated in booth No. 209 at the Machine Tool Show by this No. 11 Murchey Threading Machine. It will be running under actual shop conditions.

The No. 11 machine comes in single and double head types. A larger No. 22 double head machine is also built by Murchey for the improvement of threading operations.

MURCHEY MACHINE & TOOL CO.

Detroit **Michigan**

The Etna Swaging Machine

This machine is #103. Capacity 1″ on tubing. Length of die—3″.

Timken bearings. Motor and moving parts fully enclosed. Quickly set up. All working parts including spindle alloy steels specially heat treated.

Other sizes from 3/8″ to 4″ capacity in diameter. Die lengths to 18″.

Etna Machine Co.

3400 Maplewood Ave., Toledo, O.

(CONTINUED FROM PAGE 253)

tools. The sharper and freer cutting action of the diamond abrasive eliminates the risk of checking or cracking and so permits the production and commercial finishing of new, harder or more sensitive grades of cemented carbides. The ability of diamond wheels to remove amounts of material corresponding to comparatively large indexed feeds without appreciable wear permits accurate commercial finishing of new, larger and more complicated tools. Finally, diamond wheels furnish a simple but effective means of resharpening for users of cemented carbide tools. In the very finest grain sizes they can be used in place of the slower cutting diamond-charged lapping disks for producing an extremely fine finish and keen edge on carbide cutting tools. These advantages that diamond wheels have shown will unquestionably serve to increase the field for cemented carbide applications.

The past six years have also witnessed notable improvements in the aluminum oxide abrasive wheels used for grinding and sharpening high-speed steel and Stellite tools. Improved types of vitrified bonds have been developed by some of the grinding wheel manufacturers which serve to give a wheel a more uniform and stable composition. Certain types of these new wheels are distinguished by their snow white color and have come to be very popular on all kinds of tool-grinding operations.

For over a quarter of a century silicon carbide abrasive ranked next to the diamond in hardness. Then about a year ago one of the large grinding wheel manufacturers announced to the world that an entirely new abrasive had been produced and was ready to dispute the unique position held by the diamond by reason of its being the hardest of all abrasives.

This new abrasive is a crystalline carbide of boron, bears the trade-mark "Norbide," and is produced by a process similar to that employed in the manufacture of the familiar silicon carbide abrasive. Because it approaches the diamond in hardness, it is being used in place of the diamond powders for grinding and lapping cemented carbide tools, at a considerable saving in cost over the diamond product.

The above developments in grinding wheels for use on cutting tools have been concerned with new kinds of abrasives and bonds. In addition to these remarkable achievements, the processes of manufacturing wheels of various types have also undergone considerable improvement in the past few years. It is now possible to so control the manufacture of grinding wheels as to be able to vary the amount and spacing of abrasive grains or cutting particles within the wheel by definite, precise steps just as grain and grade are varied. This new refinement in grinding wheel manufacture is termed "controlled structure." It means that grinding wheels can be more accurately regulated, more closely fitted to the exacting requirements in today's tool rooms.

NEWS OF THE WEEK

Carnegie and Illinois Companies to Be United Under B. F. Fairless

A UNIFIED plan for the operation of the Carnegie Steel Corpn. and the Illinois Steel Co., both wholly-owned subsidiaries of the United States Steel Corpn., was approved by the directors of the Steel Corporation at a meeting last week.

The plan for unification calls for control of production and sales from a central office to be set up in Pittsburgh. Benjamin F. Fairless, formerly executive vice-president of the Republic Steel Corpn., will head the new organization.

No information has yet been given out as to what Mr. Fairless' title will be, nor has it yet been made clear whether the two subsidiary companies will be consolidated or whether they will continue to retain their corporate identities under unified direction. It is believed the first step to be undertaken will be the coordination of the producing capacity and then the finishing departments. Other steps that seem logical are unification of the sales organization and, finally, simplification of corporate structure. In the last named connection, enacted and proposed legislation will appear to be forcing the issue. In the event of a change in corporate organization, involving the creation of a single new company, the question arises as to the present status of the chief executives of the Carnegie and Illinois Steel companies. It is possible, of course, that they will retain local authority with different titles.

Combined Ingot Capacity of Over 20,000,000 Tons

Carnegie Steel Co. has an annual capacity of 10,026,500 gross tons of steel ingots; Illinois Steel Co.'s yearly capacity is 10,434,400 tons of steel ingots and castings. Carnegie has a capacity of 1,803,000 gross tons of semi-finished hot-rolled products for sale; 5,854,100 gross tons of finished hot-rolled products; and 753,900 tons of miscellaneous finished products. Illinois has a capacity of 1,947,900 tons of semi-finished hot-rolled products for sale; 5,757,500 tons of finished hot-rolled products, and 794,130 tons of miscellaneous finished products.

Individual products that they produce in common follow:

Sheet and tin plate bars, standard-section and light rails, splice bars and tie plates, heavy structural shapes, sheet piling, sheared and universal plates, hot-rolled black sheets, hot-rolled strip, hot-rolled bars, reinforcing bars, rolled steel wheels, rolled blooms and billets for forging purposes, forged axles, iron and steel castings, brass and bronze castings, etc.

How Two Companies' Products Differ

Products that Carnegie alone produces include light structural shapes, hoops, cotton ties and baling bands, blanks for seamless tubes, fitted mine ties, fitted structural material, fitted railroad ties, automobile wheel disks, fabricated T-Tri-Lok and I-Beam-Lok flooring, finished forged circular sections, slack barrel hoops, and finished wheels.

Products that Illinois Steel Co. produces which are not made by Carnegie include rerolling blooms, billets and slabs for sale, wire rods and track spikes, screw spikes, bolts and nuts.

Metals Society Announces Technical Program for Chicago Exposition

THE program for the National Metal Congress, which will open in Chicago on Sept. 30, will include papers dealing with present-day problems and developments in every branch of the metal industry. Thirty-nine papers will be presented, and there will be evening lectures for the first time in Metal Congress history. As previously announced, Dr. M. A. Grossman, Illinois Steel Co., Chicago, will speak on the heat treatment of steel each evening in the Exposition Hall.

Over 300 authorities in the metal world have contributed their time and experience to the preparation of the following program:

MONDAY, SEPT. 30

Morning

Palmer House Ball Room

"On the Preparation of Iron and Steel Specimens for Microscopic Investigations," by F. F. Lucas, Bell Telephone Laboratories, New York.

"Oxalic Acid as an Electrolytic Etching Reagent for Stainless Steels," by G. A. Ellinger, Bureau of Standards, Washington.

"On Naming the Aggregate Constituents in Steel," by J. R. Vilella, G. E. Guellich and E. C. Bain, United States Steel Corpn., New York.

Afternoon

Exposition Hall

"Arc Welding of High Carbon and Alloy Steels," by T. N. Armstrong, Norfolk Navy Yard, Portsmouth, Va.

"A Dilatometric Study of the Alpha-Gamma Transformation in High Purity Iron," by C. Wells, R. A. Ackley and R. F. Mehl, Carnegie Institute of Technology, Pittsburgh.

"Some Transient Phase Changes During the Graphitizing Reaction," by H. A. Schwartz, H. H. Johnson, and C. H. Junge, National Malleable & Steel Casting Co., Cleveland.

Evening

Exposition Hall

"Spectrographic Analysis," by E. J. Martin.

TUESDAY, OCT. 1

Morning

Palmer House Ball Room

"High Temperature Properties of Nickel-Cobalt-Iron Base Age-Hardening Alloys," by C. R. Austin, Pennsylvania State College, State College, Pa.

"Grain Size and Its Influence on Surface Decarburization of Steel," by D. H. Rowland and Clair Upthegrove, University of Michigan, Ann Arbor, Mich.

"Observations on the Oxidation of Steel," by M. Baeyertz, Illinois Steel Co., South Works, Chicago.

Morning

SIMULTANEOUS SESSION

Palmer House

"Chromium Steels of High Nitrogen Content," by Russell Franks, Union Carbide & Carbon Research Laboratories, Niagara Falls, N. Y.

"Correlation of Failures from Embrittlement of 4 to 6 Per Cent Chromium Steel with the Notched Bar Impact Test," by H. M. Wilten, Texas Co., Port Arthur, Tex.

"Factors Influencing the Nature of the Cutting Speed-Tool Life Curve," by O. W. Boston, W. W. Gilbert and C. E. Kraus, University of Michigan.

Afternoon

Exposition Hall

"Physical Properties of Metals as Affected by Ammonia Synthesis," by H. L. Maxwell, E. I. duPont, deNemours & Co., Wilmington, Del.

"Influence of Carbon Content on the High Temperature Properties of Steels," by A. E. White, C. L. Clark, University of Michigan, and R. L. Wilson, Timken Steel & Tube Co., Canton, Ohio.

"A New Heat Resistant Alloy," by S. L. Hoyt and M. A. Scheil, A. O. Smith Corpn., Milwaukee.

Evening

Exposition Hall

"Spectrographic Analysis," by E. J. Martin.

WEDNESDAY, OCT. 2

Morning

Palmer House Ball Room

ANNUAL MEETING OF A.S.M.

Campbell lecture, by H. W. McQuaid.

Afternoon

Exposition Hall

"Effect of Carbon, Oxygen and Grain Size on the Magnetic Properties of Iron-Silicon Alloys," by T. D. Yensen, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., and N. A. Ziegler, West Penn Electric Co., Pittsburgh.

"Relation of Hot Working to the McQuaid-Ehn Grain Size," by H. A. Grove, Republic Steel Corpn., Canton, Ohio.

"Austenitic Grain Size in Cast Iron," by D. W. Murphy and W. P. Wood, University of Michigan, Ann Arbor.

Evening

Exposition Hall

"Spectrographic Analysis," by E. J. Martin.

THURSDAY, OCT. 3

Morning

Palmer House Ball Room

"Notes on the Solidus Temperatures in the Systems Iron-Tungsten and Iron-Molybdenum," by W. P. Sykes, General Electric Co., Cleveland.

"The Influence of Deoxidation on the Aging of Mild Steels," by B. N. Daniloff, R. F. Mehl, Carnegie Institute of Technology, Pittsburgh, and C. H. Herty, Jr., Bethlehem Steel Co., Bethlehem, Pa.

"The Aging of Steel," by E. S. Davenport and E. C. Bain, United States Steel Corpn., New York.

Afternoon

Exposition Hall

"Endurance of Case - Hardened Gears," by O. W. McMullan, International Nickel Co., Bayonne, N. J.

"Pickle Pitting by Electrolytic Potentials as Affected by Scaling Temperatures," by C. H. McCollam and D. L. Warrick, Timken Steel & Tube Co., Canton, Ohio.

"Damping Capacity, A Factor in Fatigue," by G. R. Brophy, General Electric Co., Schenectady, N. Y.

FRIDAY, OCT. 4

Morning

Palmer House Ball Room

"Hardening Characteristics of One Per Cent Carbon Tool Steels," by T. G. Digges and Louis Jordan, Bureau of Standards, Washington.

"Interpretation of Torsion Impact Properties of Carbon Tool Steel," by G. V. Luerssen and O. V. Greene, Carpenter Steel Co., Reading, Pa.

"Contributory Effects of Furnace Atmospheres on the Grain Size of Molybdenum High-Speed Steel," by Arthur Phillips and M. J. Weldon, Yale University, New Haven, Conn.

Afternoon

Exposition Hall

"Open-Hearth Temperature Control," by Earnshaw Cook, American Brake Shoe & Foundry Co., Chicago Heights, Ill.

"The Effect of Deoxidation on the Rate of Formation of Ferrite in Commercial Steels," by D. L. McBride, Carnegie Institute of Technology, Pittsburgh; C. H. Herty, Jr., Bethlehem Steel Co., Bethlehem, Pa., and R. F. Mehl, Carnegie Institute of Technology, Pittsburgh.

"Equilibrium in the Reaction of Hydrogen with Ferrous Oxide in Liquid Iron at 1600 Degrees Cent.," by John Chipman, American Rolling Mill Co., Middletown, Ohio, and M. Fontana, E. I. duPont deNemours, Wilmington.

U. S. Steel Names Advertising Agent

THE united States Steel Corpn. has engaged Batten, Barton, Durstine & Osborn, Inc., as advertising agents for the corporation and its subsidiary companies, effective Jan. 1, 1936.

Cincinnati Tool Builder Arranges Cleveland Trip

A SPECIAL excursion for employees of the Cincinnati Milling Machine and Cincinnati Grinders, Inc., to the Cleveland Machine Tool Show is being arranged by the company for Sept. 14. A special train has been chartered and it is expected that some 700 of the employees will take advantage of the opportunity to make the trip, including meals, at a cost of $3 per person. This is less than half of the actual cost, the remainder being paid by the company.

Ludlum Moves to Acquire Wallingford

LUDLUM STEEL CO., Watervliet, N. Y., has received options to purchase substantially more than a majority of the stock of the Wallingford Steel Co., Wallingford, Conn.

This move on the part of Ludlum is in keeping with Ludlum's policy of expanding by rounding out its line of finished products in high-quality steels without unnecessarily increasing capacity in the industry.

Wallingford Steel Co. was organized in 1921 and was one of the first to manufacture cold-rolled stainless steel strip. During the depression this company steadily increased its output of stainless steel, earned its dividends and enlarged its facilities. It is now completing construction of a new mill for cold-rolling strip in stainless and other alloys, including for specific purposes some sizes of sheets and full-finished tin mill black plate.

In addition to its regular output of high-speed and carbon tool steels and other special steels, Ludlum's present range of sizes in the heat, wear and rust-resisting alloys runs from fine wire up through the bar mill ranges to billets and slabs for conversion into forms not rolled by Ludlum.

These negotiations when finally approved will open up to Ludlum the strip and sheet market in stainless and alloy steels, supplementing its other products.

The Machinery Club of Chicago has been reorganized and now occupies commodious quarters on the ground floor at Washington Boulevard and Jefferson Street. The club rooms will be officially opened with a dinner on Sept. 5.

PERSONALS

D. A. CURRIE, for the past 12 years vice-president and general manager of the Erie Foundry Co., Erie, Pa., has been elected president of the company. Mr. Currie has been associated with the Erie Foundry Co. for the past 29 years, having started as timekeeper in 1906, and later worked up through the various operating, sales and executive departments. He is also president of the Lamac Process Co., Erie, and is just concluding a three-year term as president of the Erie Manufacturers Association.

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FRANK J. MCCARTY, who has been connected since 1928 with the sales department of the Hendey Machine Co., Torrington, Conn., has been made general sales manager, with supervision over domestic and foreign sales. Prior to his association with the Hendey company, he was with the Rudell Belnap Machinery Co., Montreal.

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WILLIAM WEARNE, general superintendent of iron ore properties of the Inland Steel Co., retired voluntarily on Sept. 1, to take up his residence in San Diego, Cal. Mr. Wearne, who was a graduate of the Houghton (Mich.) School of Mines, went to Inland in 1906 as the superintendent of the Laura Mine when that property was taken over by the company, and since that date all of the developments of the company with respect to iron mining have taken place under his supervision.

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C. M. ROBERTSON is now connected in a sales capacity with the Marshall & Huschart Machinery Co., 571 West Washington Boulevard, Chicago. He is well known in the Chicago machine tool market, having gone to that city many years ago as the direct representative of the Colburn Machine Tool Co. For the past several years Mr. Robertson has been connected with the E. L. Essley Machinery Co., Chicago.

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J. M. MCNEAL, European sales manager in England and Continental Europe for the Landis Machine Co., is visiting the home office at Waynesboro, Pa. While in the United States, Mr. McNeal will attend the National Machine Tool Builders' Exposition at Cleveland.

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BEN. K. STROUD has joined the sales force of the Los Angeles

D. A. CURRIE

F. J. McCARTY

office of the Jones & Laughlin Steel Corpn. Since 1923 he has been in charge of oil field engineering and service in California fields with the National Tube Co. He was graduated from the University of California and served for several years with the Louisiana State Department of Conservation in charge of oil and gas resources.

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G. A. WHITE has been appointed vice-president in charge of operations of Rotary Electric Steel Co., Detroit. He is widely known in the industry because of his extensive experience in production of steel and in metallurgy, both in this country and abroad.

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JOHN P. POTTER has been elected president of the Shuler Axle Co., Inc., Louisville, Ky., succeeding W. E. DUGAN, resigned. Mr. Potter has had a successful career in financial affairs and will devote his attention to that side of the business. A. W. LISSAUER, president and treasurer of the Louisville Drying Machinery Co., has been elected vice-president, and will act in an advisory capacity in the manufacturing departments. H. R. SILVER, who has been with Shuler for 13 years as engineer, has been reelected secretary. G. A. DOUGHERTY, who has a record of 10 years of service, has been elected assistant secretary.

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E. R. CRAWFORD, president, McKeesport Tin Plate Co., McKeesport, Pa., has been elected a director of Blaw-Knox Co., Pittsburgh.

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CARL C. JOYS, JR., since Aug. 1, 1924, manager of sales, and later director of sales of the oil and gas products division of the A. O. Smith Corpn., Milwaukee, has been elected vice-president of the corporation.

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FRED L. WEAVER, for the past 13 years metallurgist and technical superintendent of the Bond plant of the American Radiator Co., has joined the metallurgical staff of the Great Lakes Foundry Sand Co., Detroit.

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NELSON J. DARLING, manager of the River works of the General Electric Co., at Lynn, Mass., has been also made manager of the West Lynn works, succeeding F. P. Cox, who has retired after 45 years of service with the company. N. M. DUCHEMIN, formerly superintendent of the West Lynn works, will be assistant manager in charge of operations at West Lynn, and W. G. MITCHELL continues in a similar capacity at the River works.

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E. S. MILLER has resigned as general superintendent of the Rotary Electric Steel Co., Detroit. He has made no announcement in regard to future plans.

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CLARENCE H. KING, president of Evens & Howard Sewer Pipe Co., St. Louis, has been elected president of the American Refractories Institute, Pittsburgh.

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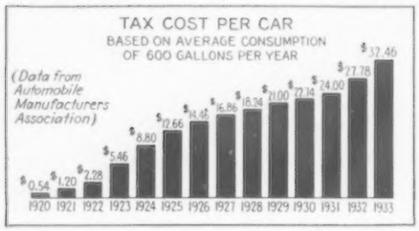
MARTIN H. KIDDER, formerly identified with the Link-Belt Co., Boston Gear Works and the Apollo Metal Works, has been appointed industrial relations director of the American Foundry Equipment Co., Mishawaka, Ind., to serve indus-

(CONTINUED ON PAGE 320)



THIS WEEK ON THE

Car Makers Plan Heavy Production For Fourth Quarter

DETROIT, Sept. 4.

WITH its characteristic zip, the automobile industry is planning big things for 1936. Buoyed by its amazing success this year, it envisions production and sale of at least 4,000,000 cars next year. It is impatient, therefore, to get started on new models so that stocks in the field will be ample when public announcements are made. It is putting pressure on equipment makers to get new machinery delivered as quickly as possible and, in some cases, is getting parts manufacture under way by using makeshift set-ups until new machine tools are ready.

September doesn't look like much from the standpoint of car production, but the fourth quarter will see factories in southern Michigan going full tilt. Assemblies in that period have averaged 395,064 units during the six years from 1929 through 1934. It is anticipated that output in the last three months of 1935 will be far in excess of that figure and may equal the 747,039 units built in the final quarter of 1929.

Although independents have done better this year than last, because of the expansion of retail car sales generally, the Big Three (Ford, General Motors and Chrysler) still are relentlessly squeezing the little fellows into a smaller portion of the market. Latest registrations of passenger cars showed the three leaders gobbling 92 per cent of all sales, whereas in the corresponding period a year ago their share was 91 per cent. The only satisfaction to be derived by independents is that their larger competitors have stood still this year in commercial car and truck registrations at 82 per cent of the total. This is slight comfort, however, since registrations don't give an accurate conception of Government purchases which have been much greater this year than in 1934 and which have largely been made from the Big Three, particularly from Chevrolet and Dodge.

Close Race in 1936

Ford has made a runaway race this year, registrations thus far available showing it almost 200,000 units ahead of Chevrolet. The latter is by no means downhearted, however, and vows that it will give Ford the battle of its life in 1936. It swears that there will be no more production delays (and Chevrolet dealers have Mr. Sloan's and Mr. Knudsen's word for it that they will have plenty of cars at announcement time). The industry, therefore, looks for a much tighter contest for first place in 1936 than was staged this year.

It won't surprise anyone in Detroit if the leading rivals go into the 1936 car season on an even footing, so far as dealer stocks are concerned, for the first time in several years. There are no major production problems to be licked, since changes in car design are mostly minor. The only possible delay might be labor trouble and that appears remote.

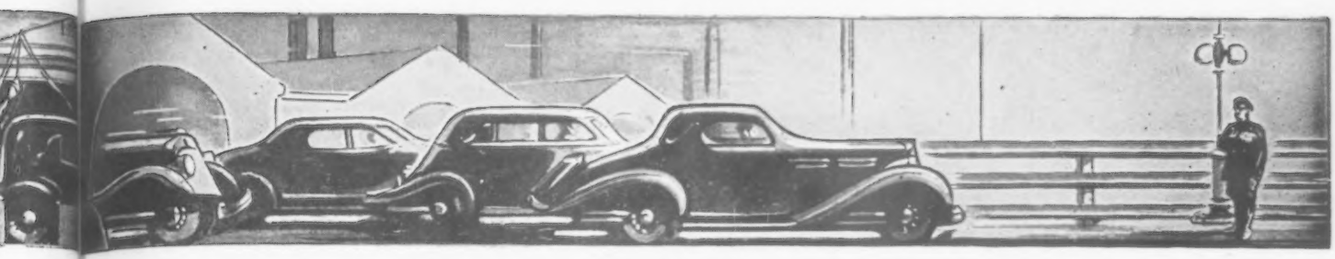
At the beginning of 1935 General Motors was seriously handicapped by shortage of bodies. Apparently Fisher Body isn't going to let itself get into a jam again. Its stamping departments have been in operation almost without interruption throughout the summer and when the assembly of Pontiac bodies began at Fisher's Pontiac factory about two weeks ago, a generous backlog of stamped parts was on hand. Fisher at Cleveland has been down for a short time, but is resuming work on 1936 Chevrolet parts this week. Fisher's new plant at Lansing (the remodeled former Durant plant) swings into action on Oldsmobile bodies today.

September Schedules Irregular

September schedules of car makers are flexible with final figures depending on how smoothly production will be moving along assembly lines the latter part of the month. Rough estimates put the total around 100,000 units, which compares with 85,179 units in November of last year when the industry was in the midst of changing models. Ford probably will build 30,000 to 35,000 cars this month. The Chrysler total is not likely to be more than 20,000 to 25,000 cars.

Buick is the most active company in the industry today. Feverishly at work supplying dealers with stocks in anticipation of announcement of its 1936 line late this month, it should build about 10,000 cars in September. Pontiac, counting originally on resuming operations this week, has been delayed and will not get started until next week. It probably will assemble 4000 or 5000 cars.

Chevrolet's gear and axle plant is now working on 1936 parts and is said to have a heavy program mapped ahead. Chevrolet has given orders to some suppliers to begin shipping parts for its new cars to branch assembly plants about Sept. 12. This indicates that assemblies of the new jobs will start around Oct. 1, with production of current models continuing up al-



HE ASSEMBLY LINE

most to that date. The Dodge factory, where many parts for all Chrysler-made cars are built, is again operating after a short shutdown, turning out 1936 parts.

Many Ford parts suppliers have received substantial orders and again are running at a good rate. In some cases, releases cover requirements for more than 100,000 cars. Ford will make the swing-over to its 1936 production without any break in operations at the Rouge plant.

Hudson is spending large sums for new dies, intending to make for 1936 a complete change in the appearance of both the Hudson and Terraplane. These expenditures do not mean, as some people have intimated, that Hudson intends to present cars of radical design, such as Chrysler did in 1934 when it first offered the Airflow.

If imitation still is the sincerest form of flattery, Oldsmobile well may be proud. It is whispered in well-informed circles that at least two 1936 cars, one of them in the General Motors family, have copied some of the eye-appealing features which helped Oldsmobile this year sell the largest number of cars in its history.

Car manufacturers are causing machine tool builders sleepless nights by their insistence on deliveries which are physically impossible to make. Some automotive executives don't seem to realize that equipment makers no longer have empty shops and can't step around at the crack of Detroit's whip. Delays in delivery of equipment can be traced, in more cases than one might offhand suppose, to the dilly-dallying tactics of production executives in deciding what they actually wanted. It has not been unusual for some of these executives to place an order on the promise of delivery by a specified date and then hold up the starting of work for two weeks pending proposed changes, only to try to hold the machine builder to the original delivery date.

BY BURNHAM FINNEY
Detroit Editor, The Iron Age

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The automobile industry has spent millions on new machinery this year, but there is good reason to believe that the spending for modern equipment has just started. The first wave of buying has passed, but another wave should break before many weeks have gone by. Many companies are said to be preparing to loosen their purse-strings on behalf of plant modernization in 1936. Detroit is speculating as to the influence of the tax laws just enacted by Congress in this prospective outpouring of money for machinery. Perhaps car makers would rather invest larger sums in cost-saving equipment than pay out more money in the form of added Federal taxes. Not that this will be the determining factor in placing equipment orders, but there is the interesting possibility that it may accelerate programs which otherwise might take considerable time in getting past the formative stage.

Cadillac in the past week has spent around $125,000 for machine tools in plugging weak spots in its production lines. Wilcox-Rich is reported to have bought equipment costing about $75,000.

Steel Orders Large

Automotive steel orders have been substantial in volume, but shipping releases in certain instances have been slow in coming through. Some steel companies, for instance, have rolled considerable tonnages and are holding this material pending shipping instructions from automobile manufacturers. The delay in releases is causing congestion at the mills. Ford, having recently bought almost 100,000 tons of flat-rolled steel, has no intention of purchasing an additional 60,000 tons at this time as reported elsewhere. Until its production schedules for the next 60 days become more clearly outlined, further steel commitments by Ford will be negligible. Sizable orders for steel are not expected from Dearborn during the next two weeks.

Die shops in the Detroit district are reported to have on hand orders for a die program for a new small car of orthodox design to be made in Russia. The work has been on the drawing boards for several weeks and the castings of the dies is about ready to begin. Expenditures are said roughly to bulk around $500,000. The car for which these dies are being built is believed to be the same one for which machine tool equipment was bought recently in this country.

Chevrolet is installing in its 10 branch assembly plants special equipment for cromodizing fenders, running boards and other sheet steel parts to prevent rust and to give protection against salt and other chemicals used in the treatment of highways to control dust or melt snow and ice. The new process, which is the product of the American Chemical Paint Co., was first put in the new Baltimore assembly plant and then extended to others. Chevrolet and Fisher Body are spending $500,000 to enlarge facilities at the Tarrytown, N. Y., assembly plant.

Detroit Notes

The new Kelsey-Hayes foundry is about ready. Budd Wheel is building a new foundry in Detroit which should be in production soon. . . . Consolidated Motors at Lima, Ohio, which is a reorganization of Garford Truck Co., is to make light trucks having independently sprung front wheels using leaf springs, the design being that developed by the Leaf Spring Institute. . . . Pontiac would like to reopen its foundry which has been idle for several years, but seemingly can't get permission from the General Motors high command. The foundry may yet be put into operation, but probably not in time for the 1936 production season.

Announcing AN IMPROVED REAL HIGH DUTY

PEERLESS

METAL SAWING MACHINE

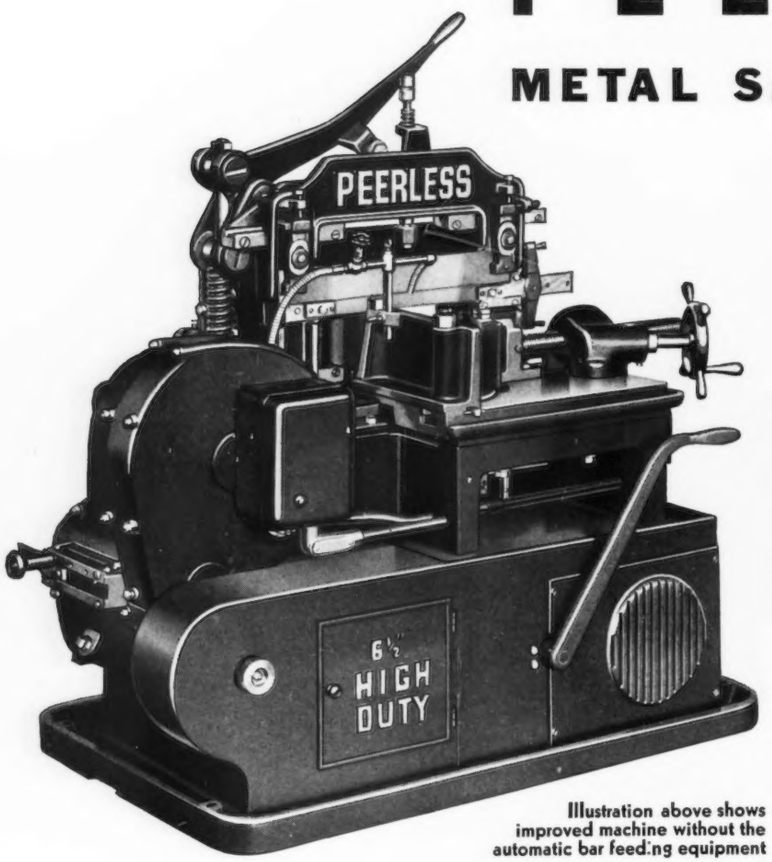


Illustration above shows improved machine without the automatic bar feeding equipment

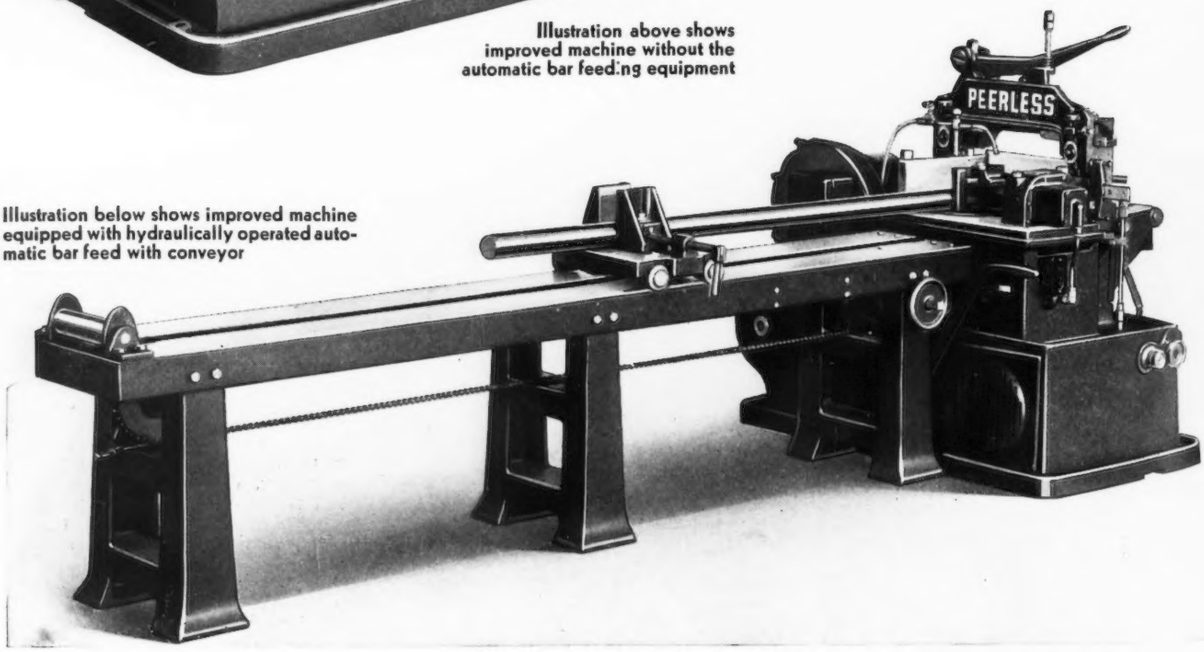
A Sturdy Machine Designed for Fast, Accurate Production Sawing . . .

AT THE SHOW

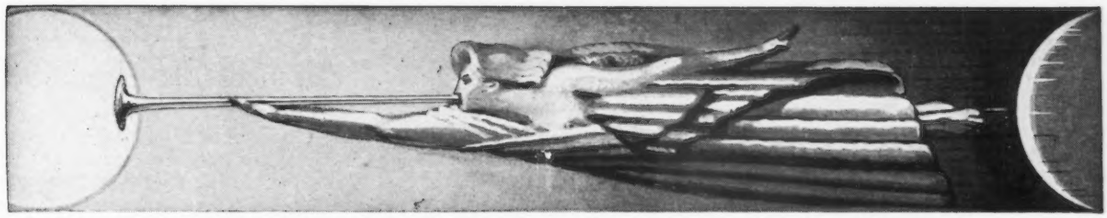
SPACE No. 4

6½" x 6½" Capacity

Illustration below shows improved machine equipped with hydraulically operated automatic bar feed with conveyor



PEERLESS MACHINE COMPANY • RACINE, WISCONSIN



NEWS OF THE WEEK

Carnegie and Illinois Companies to Be United Under B. F. Fairless

A UNIFIED plan for the operation of the Carnegie Steel Corpn. and the Illinois Steel Co., both wholly-owned subsidiaries of the United States Steel Corpn., was approved by the directors of the Steel Corporation at a meeting last week.

The plan for unification calls for control of production and sales from a central office to be set up in Pittsburgh. Benjamin F. Fairless, formerly executive vice-president of the Republic Steel Corpn., will head the new organization.

No information has yet been given out as to what Mr. Fairless' title will be, nor has it yet been made clear whether the two subsidiary companies will be consolidated or whether they will continue to retain their corporate identities under unified direction. It is believed the first step to be undertaken will be the coordination of the producing capacity and then the finishing departments. Other steps that seem logical are unification of the sales organization and, finally, simplification of corporate structure. In the last named connection, enacted and proposed legislation will appear to be forcing the issue. In the event of a change in corporate organization, involving the creation of a single new company, the question arises as to the present status of the chief executives of the Carnegie and Illinois Steel companies. It is possible, of course, that they will retain local authority with different titles.

Combined Ingot Capacity of Over 20,000,000 Tons

Carnegie Steel Co. has an annual capacity of 10,026,500 gross tons of steel ingots; Illinois Steel Co.'s yearly capacity is 10,434,400 tons of steel ingots and castings. Carnegie has a capacity of 1,803,000 gross tons of semi-finished hot-rolled products for sale; 5,854,100 gross tons of finished hot-rolled products; and 753,900 tons of miscellaneous finished products. Illinois has a capacity of 1,947,900 tons of semi-finished hot-rolled products for sale; 5,757,500 tons of finished hot-rolled products, and 794,130 tons of miscellaneous finished products.

Individual products that they produce in common follow:

Sheet and tin plate bars, standard-section and light rails, splice bars and tie plates, heavy structural shapes, sheet piling, sheared and universal plates, hot-rolled black sheets, hot-rolled strip, hot-rolled bars, reinforcing bars, rolled steel wheels, rolled blooms and billets for forging purposes, forged axles, iron and steel castings, brass and bronze castings, etc.

How Two Companies' Products Differ

Products that Carnegie alone produces include light structural shapes, hoops, cotton ties and baling bands, blanks for seamless tubes, fitted mine ties, fitted structural material, fitted railroad ties, automobile wheel disks, fabricated T-Tri-Lok and I-Beam-Lok flooring, finished forged circular sections, slack barrel hoops, and finished wheels.

Products that Illinois Steel Co. produces which are not made by Carnegie include rerolling blooms, billets and slabs for sale, wire rods and track spikes, screw spikes, bolts and nuts.

Metals Society Announces Technical Program for Chicago Exposition

THE program for the National Metal Congress, which will open in Chicago on Sept. 30, will include papers dealing with present-day problems and developments in every branch of the metal industry. Thirty-nine papers will be presented, and there will be evening lectures for the first time in Metal Congress history. As previously announced, Dr. M. A. Grossman, Illinois Steel Co., Chicago, will speak on the heat treatment of steel each evening in the Exposition Hall.

Over 300 authorities in the metal world have contributed their time and experience to the preparation of the following program:

MONDAY, SEPT. 30

Morning

Palmer House Ball Room

"On the Preparation of Iron and Steel Specimens for Microscopic Investigations," by F. F. Lucas, Bell Telephone Laboratories, New York.

"Oxalic Acid as an Electrolytic Etching Reagent for Stainless Steels," by G. A. Ellinger, Bureau of Standards, Washington.

"On Naming the Aggregate Constituents in Steel," by J. R. Vilella, G. E. Guellich and E. C. Bain, United States Steel Corpn., New York.

Afternoon

Exposition Hall

"Arc Welding of High Carbon and Alloy Steels," by T. N. Armstrong, Norfolk Navy Yard, Portsmouth, Va.

"A Dilatometric Study of the Alpha-Gamma Transformation in High Purity Iron," by C. Wells, R. A. Ackley and R. F. Mehl, Carnegie Institute of Technology, Pittsburgh.

"Some Transient Phase Changes During the Graphitizing Reaction," by H. A. Schwartz, H. H. Johnson, and C. H. Junge, National Malleable & Steel Casting Co., Cleveland.

Evening

Exposition Hall

"Spectrographic Analysis," by E. J. Martin.

TUESDAY, OCT. 1

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"Hardening Characteristics of One Per Cent Carbon Tool Steels," by T. G. Digges and Louis Jordan, Bureau of Standards, Washington.

"Interpretation of Torsion Impact Properties of Carbon Tool Steel," by G. V. Luerssen and O. V. Greene, Carpenter Steel Co., Reading, Pa.

"Contributory Effects of Furnace Atmospheres on the Grain Size of Molybdenum High-Speed Steel," by Arthur Phillips and M. J. Weldon, Yale University, New Haven, Conn.

Afternoon

Exposition Hall

"Open-Hearth Temperature Control," by Earnshaw Cook, American Brake Shoe & Foundry Co., Chicago Heights, Ill.

"The Effect of Deoxidation on the Rate of Formation of Ferrite in Commercial Steels," by D. L. McBride, Carnegie Institute of Technology, Pittsburgh; C. H. Herty, Jr., Bethlehem Steel Co., Bethlehem, Pa., and R. F. Mehl, Carnegie Institute of Technology, Pittsburgh.

"Equilibrium in the Reaction of Hydrogen with Ferrous Oxide in Liquid Iron at 1600 Degrees Cent.," by John Chipman, American Rolling Mill Co., Middletown, Ohio, and M. Fontana, E. I. duPont deNemours, Wilmington.

U. S. Steel Names Advertising Agent

THE united States Steel Corpn. has engaged Batten, Barton, Durstine & Osborn, Inc., as advertising agents for the corporation and its subsidiary companies, effective Jan. 1, 1936.

Cincinnati Tool Builder Arranges Cleveland Trip

A SPECIAL excursion for employees of the Cincinnati Milling Machine and Cincinnati Grinders, Inc., to the Cleveland Machine Tool Show is being arranged by the company for Sept. 14. A special train has been chartered and it is expected that some 700 of the employees will take advantage of the opportunity to make the trip, including meals, at a cost of $3 per person. This is less than half of the actual cost, the remainder being paid by the company.

Ludlum Moves to Acquire Wallingford

LUDLUM STEEL CO., Watervliet, N. Y., has received options to purchase substantially more than a majority of the stock of the Wallingford Steel Co., Wallingford, Conn.

This move on the part of Ludlum is in keeping with Ludlum's policy of expanding by rounding out its line of finished products in high-quality steels without unnecessarily increasing capacity in the industry.

Wallingford Steel Co. was organized in 1921 and was one of the first to manufacture cold-rolled stainless steel strip. During the depression this company steadily increased its output of stainless steel, earned its dividends and enlarged its facilities. It is now completing construction of a new mill for cold-rolling strip in stainless and other alloys, including for specific purposes some sizes of sheets and full-finished tin mill black plate.

In addition to its regular output of high-speed and carbon tool steels and other special steels, Ludlum's present range of sizes in the heat, wear and rust-resisting alloys runs from fine wire up through the bar mill ranges to billets and slabs for conversion into forms not rolled by Ludlum.

These negotiations when finally approved will open up to Ludlum the strip and sheet market in stainless and alloy steels, supplementing its other products.

The Machinery Club of Chicago has been reorganized and now occupies commodious quarters on the ground floor at Washington Boulevard and Jefferson Street. The club rooms will be officially opened with a dinner on Sept. 5.

PERSONALS

D. A. CURRIE, for the past 12 years vice-president and general manager of the Erie Foundry Co., Erie, Pa., has been elected president of the company. Mr. Currie has been associated with the Erie Foundry Co. for the past 29 years, having started as timekeeper in 1906, and later worked up through the various operating, sales and executive departments. He is also president of the Lamac Process Co., Erie, and is just concluding a three-year term as president of the Erie Manufacturers Association.

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FRANK J. MCCARTY, who has been connected since 1928 with the sales department of the Hendey Machine Co., Torrington, Conn., has been made general sales manager, with supervision over domestic and foreign sales. Prior to his association with the Hendey company, he was with the Rudell Belnap Machinery Co., Montreal.

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WILLIAM WEARNE, general superintendent of iron ore properties of the Inland Steel Co., retired voluntarily on Sept. 1, to take up his residence in San Diego, Cal. Mr. Wearne, who was a graduate of the Houghton (Mich.) School of Mines, went to Inland in 1906 as the superintendent of the Laura Mine when that property was taken over by the company, and since that date all of the developments of the company with respect to iron mining have taken place under his supervision.

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C. M. ROBERTSON is now connected in a sales capacity with the Marshall & Huschart Machinery Co., 571 West Washington Boulevard, Chicago. He is well known in the Chicago machine tool market, having gone to that city many years ago as the direct representative of the Colburn Machine Tool Co. For the past several years Mr. Robertson has been connected with the E. L. Essley Machinery Co., Chicago.

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J. M. MCNEAL, European sales manager in England and Continental Europe for the Landis Machine Co., is visiting the home office at Waynesboro, Pa. While in the United States, Mr. McNeal will attend the National Machine Tool Builders' Exposition at Cleveland.

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BEN. K. STROUD has joined the sales force of the Los Angeles

D. A. CURRIE

F. J. McCARTY

office of the Jones & Laughlin Steel Corpn. Since 1923 he has been in charge of oil field engineering and service in California fields with the National Tube Co. He was graduated from the University of California and served for several years with the Louisiana State Department of Conservation in charge of oil and gas resources.

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G. A. WHITE has been appointed vice-president in charge of operations of Rotary Electric Steel Co., Detroit. He is widely known in the industry because of his extensive experience in production of steel and in metallurgy, both in this country and abroad.

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JOHN P. POTTER has been elected president of the Shuler Axle Co., Inc., Louisville, Ky., succeeding W. E. DUGAN, resigned. Mr. Potter has had a successful career in financial affairs and will devote his attention to that side of the business. A. W. LISSAUER, president and treasurer of the Louisville Drying Machinery Co., has been elected vice-president, and will act in an advisory capacity in the manufacturing departments. H. R. SILVER, who has been with Shuler for 13 years as engineer, has been reelected secretary. G. A. DOUGHERTY, who has a record of 10 years of service, has been elected assistant secretary.

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E. R. CRAWFORD, president, McKeesport Tin Plate Co., McKeesport, Pa., has been elected a director of Blaw-Knox Co., Pittsburgh.

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CARL C. JOYS, JR., since Aug. 1, 1924, manager of sales, and later director of sales of the oil and gas products division of the A. O. Smith Corpn., Milwaukee, has been elected vice-president of the corporation.

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FRED L. WEAVER, for the past 13 years metallurgist and technical superintendent of the Bond plant of the American Radiator Co., has joined the metallurgical staff of the Great Lakes Foundry Sand Co., Detroit.

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NELSON J. DARLING, manager of the River works of the General Electric Co., at Lynn, Mass., has been also made manager of the West Lynn works, succeeding F. P. COX, who has retired after 45 years of service with the company. N. M. DUCHEMIN, formerly superintendent of the West Lynn works, will be assistant manager in charge of operations at West Lynn, and W. G. MITCHELL continues in a similar capacity at the River works.

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E. S. MILLER has resigned as general superintendent of the Rotary Electric Steel Co., Detroit. He has made no announcement in regard to future plans.

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CLARENCE H. KING, president of Evens & Howard Sewer Pipe Co., St. Louis, has been elected president of the American Refractories Institute, Pittsburgh.

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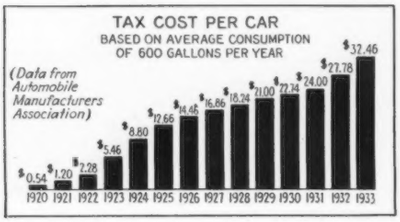
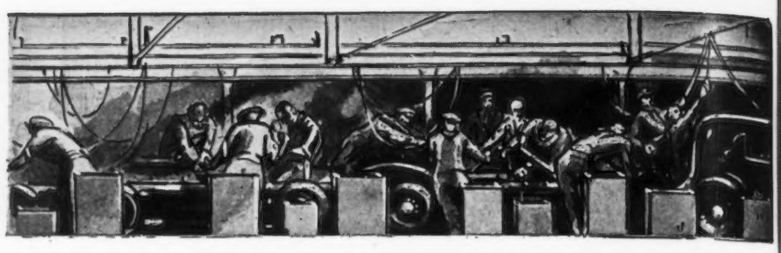
MARTIN H. KIDDER, formerly identified with the Link-Belt Co., Boston Gear Works and the Apollo Metal Works, has been appointed industrial relations director of the American Foundry Equipment Co., Mishawaka, Ind., to serve indus-

(CONTINUED ON PAGE 320)





THIS WEEK ON THE

Car Makers Plan Heavy Production For Fourth Quarter

DETROIT, Sept. 4.

WITH its characteristic zip, the automobile industry is planning big things for 1936. Buoyed by its amazing success this year, it envisions production and sale of at least 4,000,000 cars next year. It is impatient, therefore, to get started on new models so that stocks in the field will be ample when public announcements are made. It is putting pressure on equipment makers to get new machinery delivered as quickly as possible and, in some cases, is getting parts manufacture under way by using makeshift set-ups until new machine tools are ready.

September doesn't look like much from the standpoint of car production, but the fourth quarter will see factories in southern Michigan going full tilt. Assemblies in that period have averaged 395,064 units during the six years from 1929 through 1934. It is anticipated that output in the last three months of 1935 will be far in excess of that figure and may equal the 747,039 units built in the final quarter of 1929.

Although independents have done better this year than last, because of the expansion of retail car sales generally, the Big Three (Ford, General Motors and Chrysler) still are relentlessly squeezing the little fellows into a smaller portion of the market. Latest registrations of passenger cars showed the three leaders gobbling 92 per cent of all sales, whereas in the corresponding period a year ago their share was 91 per cent. The only satisfaction to be derived by independents is that their larger competitors have stood still this year in commercial car and truck registrations at 82 per cent of the total. This is slight comfort, however, since registrations don't give an accurate conception of Government purchases which have been much greater this year than in 1934 and which have largely been made from the Big Three, particularly from Chevrolet and Dodge.

Close Race in 1936

Ford has made a runaway race this year, registrations thus far available showing it almost 200,000 units ahead of Chevrolet. The latter is by no means downhearted, however, and vows that it will give Ford the battle of its life in 1936. It swears that there will be no more production delays (and Chevrolet dealers have Mr. Sloan's and Mr. Knudsen's word for it that they will have plenty of cars at announcement time). The industry, therefore, looks for a much tighter contest for first place in 1936 than was staged this year.

It won't surprise anyone in Detroit if the leading rivals go into the 1936 car season on an even footing, so far as dealer stocks are concerned, for the first time in several years. There are no major production problems to be licked, since changes in car design are mostly minor. The only possible delay might be labor trouble and that appears remote.

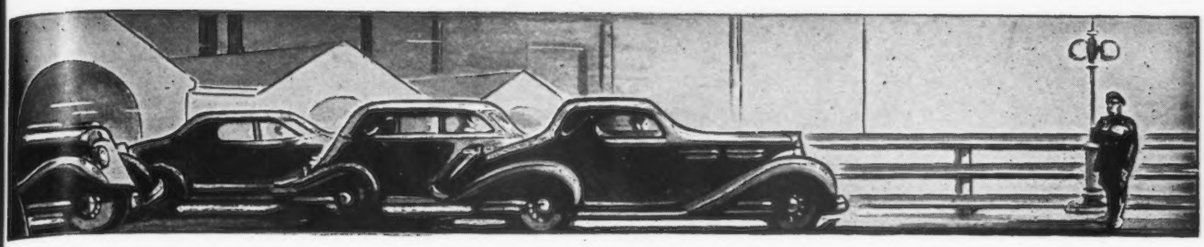
At the beginning of 1935 General Motors was seriously handicapped by shortage of bodies. Apparently Fisher Body isn't going to let itself get into a jam again. Its stamping departments have been in operation almost without interruption throughout the summer and when the assembly of Pontiac bodies began at Fisher's Pontiac factory about two weeks ago, a generous backlog of stamped parts was on hand. Fisher at Cleveland has been down for a short time, but is resuming work on 1936 Chevrolet parts this week. Fisher's new plant at Lansing (the remodeled former Durant plant) swings into action on Oldsmobile bodies today.

September Schedules Irregular

September schedules of car makers are flexible with final figures depending on how smoothly production will be moving along assembly lines the latter part of the month. Rough estimates put the total around 100,000 units, which compares with 85,179 units in November of last year when the industry was in the midst of changing models. Ford probably will build 30,000 to 35,000 cars this month. The Chrysler total is not likely to be more than 20,000 to 25,000 cars.

Buick is the most active company in the industry today. Feverishly at work supplying dealers with stocks in anticipation of announcement of its 1936 line late this month, it should build about 10,000 cars in September. Pontiac, counting originally on resuming operations this week, has been delayed and will not get started until next week. It probably will assemble 4000 or 5000 cars.

Chevrolet's gear and axle plant is now working on 1936 parts and is said to have a heavy program mapped ahead. Chevrolet has given orders to some suppliers to begin shipping parts for its new cars to branch assembly plants about Sept. 12. This indicates that assemblies of the new jobs will start around Oct. 1, with production of current models continuing up al-



ASSEMBLY LINE

BY BURNHAM FINNEY
Detroit Editor, The Iron Age

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most to that date. The Dodge factory, where many parts for all Chrysler-made cars are built, is again operating after a short shutdown, turning out 1936 parts.

Many Ford parts suppliers have received substantial orders and again are running at a good rate. In some cases, releases cover requirements for more than 100,000 cars. Ford will make the swing-over to its 1936 production without any break in operations at the Rouge plant.

Hudson is spending large sums for new dies, intending to make for 1936 a complete change in the appearance of both the Hudson and Terraplane. These expenditures do not mean, as some people have intimated, that Hudson intends to present cars of radical design, such as Chrysler did in 1934 when it first offered the Airflow.

If imitation still is the sincerest form of flattery, Oldsmobile well may be proud. It is whispered in well-informed circles that at least two 1936 cars, one of them in the General Motors family, have copied some of the eye-appealing features which helped Oldsmobile this year sell the largest number of cars in its history.

Car manufacturers are causing machine tool builders sleepless nights by their insistence on deliveries which are physically impossible to make. Some automotive executives don't seem to realize that equipment makers no longer have empty shops and can't step around at the crack of Detroit's whip. Delays in delivery of equipment can be traced, in more cases than one might offhand suppose, to the dilly-dallying tactics of production executives in deciding what they actually wanted. It has not been unusual for some of these executives to place an order on the promise of delivery by a specified date and then hold up the starting of work for two weeks pending proposed changes, only to try to hold the machine builder to the original delivery date.

The automobile industry has spent millions on new machinery this year, but there is good reason to believe that the spending for modern equipment has just started. The first wave of buying has passed, but another wave should break before many weeks have gone by. Many companies are said to be preparing to loosen their purse-strings on behalf of plant modernization in 1936. Detroit is speculating as to the influence of the tax laws just enacted by Congress in this prospective outpouring of money for machinery. Perhaps car makers would rather invest larger sums in cost-saving equipment than pay out more money in the form of added Federal taxes. Not that this will be the determining factor in placing equipment orders, but there is the interesting possibility that it may accelerate programs which otherwise might take considerable time in getting past the formative stage.

Cadillac in the past week has spent around $125,000 for machine tools in plugging weak spots in its production lines. Wilcox-Rich is reported to have bought equipment costing about $75,000.

Steel Orders Large

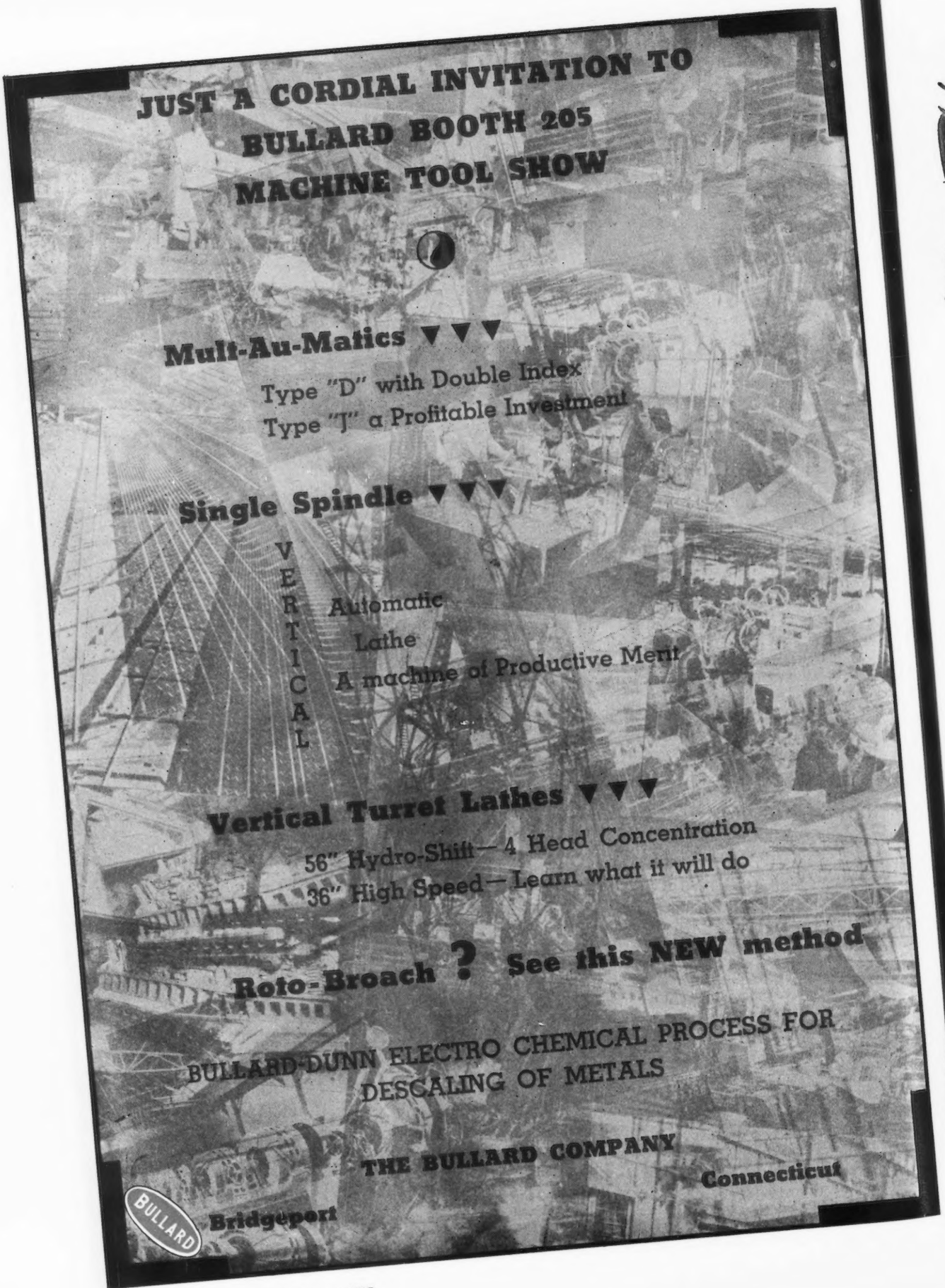
Automotive steel orders have been substantial in volume, but shipping releases in certain instances have been slow in coming through. Some steel companies, for instance, have rolled considerable tonnages and are holding this material pending shipping instructions from automobile manufacturers. The delay in releases is causing congestion at the mills. Ford, having recently bought almost 100,000 tons of flat-rolled steel, has no intention of purchasing an additional 60,000 tons at this time as reported elsewhere. Until its production schedules for the next 60 days become more clearly outlined, further steel commitments by Ford will be negligible. Sizable orders for steel are not expected from Dearborn during the next two weeks.

Die shops in the Detroit district are reported to have on hand orders for a die program for a new small car of orthodox design to be made in Russia. The work has been on the drawing boards for several weeks and the castings of the dies is about ready to begin. Expenditures are said roughly to bulk around $500,000. The car for which these dies are being built is believed to be the same one for which machine tool equipment was bought recently in this country.

Chevrolet is installing in its 10 branch assembly plants special equipment for cromodizing fenders, running boards and other sheet steel parts to prevent rust and to give protection against salt and other chemicals used in the treatment of highways to control dust or melt snow and ice. The new process, which is the product of the American Chemical Paint Co., was first put in the new Baltimore assembly plant and then extended to others. Chevrolet and Fisher Body are spending $500,000 to enlarge facilities at the Tarrytown, N. Y., assembly plant.

Detroit Notes

The new Kelsey-Hayes foundry is about ready. Budd Wheel is building a new foundry in Detroit which should be in production soon. . . . Consolidated Motors at Lima, Ohio, which is a reorganization of Garford Truck Co., is to make light trucks having independently sprung front wheels using leaf springs, the design being that developed by the Leaf Spring Institute. . . . Pontiac would like to reopen its foundry which has been idle for several years, but seemingly can't get permission from the General Motors high command. The foundry may yet be put into operation, but probably not in time for the 1936 production season.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THIS WEEK IN WASHINGTON

Adjournment of Congress changes Washington from cave of winds to vacuum.

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President weathers session in good health and spirits and 1936 campaign can now get under way in earnest.

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New labor board being set up; Chairman Madden outlines difficulty of defining its limitations

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Early test of constitutionality of Guffey bill is promised by suit filed in District of Columbia court.

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FHA outlines policy to be followed in modernization credit plan.

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BY L. W. MOFFETT

Resident Washington Editor, The Iron Age

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WASHINGTON, Sept. 4. — The din and the shouting in Washington have died down temporarily. . . . At the nation's capital it seems like a vacuum has replaced a cave of winds. . . . Congress has departed, its candidates ready to take the hustings and view with alarm or point with pride. . . . It was a subservient Congress with its all-time peace record of some $10,000,000,000 appropriated, much of it with a great deal of cloakroom grumbling and dread of facing taxpayers. . . .

Even some Democrats, instead of accepting $29,000,000,000 as the public debt, make estimates of $40,000,000,000 to $50,000,000,000, which is known as the danger line that leads to bankruptcy. . . . They can arrive at no less an estimate when taking into account the obligations to which the Congress committed the country. . . . And some of them, alarmed, are insisting that sharp retrenchments must be made at the next session and the public given definite assurance as to when and how the budget will be balanced. . . . Whatever the justification for the higher figure, it is evident that taxpayers finally are becoming public debt conscious and they seem to have developed more thought on the significance of a balanced budget and the significance of an unbalanced budget. . . .

Despite its rather self-assured tone, as though speaking the President's mind, the Creel article in *Collier's* saying that the President proposes to balance the budget in 1939 was of no help. . . . For the President said he had not read the article and therefore could not comment on it. . . . Anyhow he said he might not be President in 1939. . . . The time when realities will force aside political gestures and make taxpayers lively aware that, small and large, they will have to go deep into their pockets and pay for the spending orgy will be after election next year. . . . And it will not be a demagogic soak-the-rich program or confined to heavier assessments on big business. . . . Not the present generation alone, but generations yet unborn will have to share the tax. . . . And taxes are much more than direct assessments that go to public treasuries. . . . In one form or another they are reflected in higher living costs, increased rents, reduced capital funds and profits, and wages that are disproportionate to living costs. . . .

Maintaining a tremendous Federal bureaucracy with a growth rather than a decrease in worse than futile attempts at regimentation backed with subsidies is assuredly a source of taxation. . . . Perhaps it would be just as well to add even further to the list of bureaucrats in order to hasten a breakdown through sheer absurdity and impossibility of enforcing the countless and conflicting rules, regulations, orders, and the favoring of one class against another. . . . Even farm groups, while relishing Government checks for curtailing crops they never intended to plant, are reported to be showing real concern over forthcoming taxes they will have to pay now that they have become property owners. . . . While a spud dictator is now scheduled to join the long list of royal regimenters, rising revolt already is threatened by some potato growers and his crown, if it gets on his head at all, promises to be knocked off, if not by the revolters, by the courts, which stare so menacingly

at divers pieces of class legislation. . . .

When these cases come before the courts for tests, the answer will be made to New Deal complaints that only destructive criticism is directed at the Administration—that nothing constructive is offered. . . . Constructive criticism of much of its legislation might be offered by the simple term, "Don't." . . . Meanwhile, of course, it might be well to help those in need and to let natural economic forces have a chance. . . . They will, anyhow, sooner or later, as is evidenced by the fact that, handicapped as they are by brain trust straitjackets, they are bringing about recovery, which, it is to be sincerely hoped, will be soon, complete and permanent. . . . When that time comes and the 20,000,000 on relief rolls are reduced to a minimum there will be justification for easy reference to the "recent depression." . . . But until conditions are vastly improved, until it quits its class legislating, until it stops enacting laws that its own legal advisers think are unconstitutional, the New Deal will face a continued barrage of criticism. . . . All the raging possible against the criticism will not stop it. . . . Nor will the recital of jingles in the tempo of Mother Goose stop it. . . . No more so than the New Dealers themselves could be stopped in their widespread campaign of smear and of unkept promises. . . . In the end, smear and destructive criticism, no matter what the source, will seek and find its deserved level. . . .

The so-called whispering campaign has been linked with the charge that it has an ugly smear attempt directed at the President. . . . The country probably has arrived at the sensible conclusion that the President's health is sound and if efforts have been made to make the people think it has broken down, they will definitely get visible evidence to the contrary when the President starts on his Western tour. . . . Following the recent session of Congress, the Chief Executive did have a rather tired look, and he would have had to be a superman to have escaped it. . . . But any talk of impairment of his health is untrue. . . . And he has just proved most conclusively that he has a powerful dexter hand to sign and veto in handling the enormous mass of legislation sent to the White House by the recent session of Congress. . . . He didn't even suffer writer's cramp, and was able to leave for Hyde Park in good trim. . . .

Among the measures the President signed shortly before leaving Washington were the share-the-wealth tax bill and the Guffey coal bill. . . . Previously he had signed the Wagner-Connery labor disputes and the social security bills. . . .

The third deficiency bill died under the raving filibuster of Huey Long. . . . It carried the political log-rolling rider for 12c. cotton and 90c. wheat Government loans. . . . Supporters of the rider, Senators from the South and some from wheat-growing sections sought to blackjack the rider through by tying it to the important appropriation measure. . . . Failure of the appropriation left some of the new boards and commission high and dry for funds, though the President has said funds will be obtained from other sources to set the board up and administration got under way until the next session. . . . The National Labor Relations Board has a carry-over fund of $300,000, allocated to the former National Labor Relations Board. . . . Hence this Wagner-Connery-organized labor board will be able to proceed under full steam until the next session of Congress, when it will get more appropriations. . . . Unless the act is knocked out by the Supreme Court, which convenes Oct. 7. . . . The court has such a bulk of New Deal cases before it, many of them relating to the constitutionality of TVA and AAA, that it is not possible to say when it may get to cases involving the Wagner-Connery labor disputes and Guffey-Snyder coal acts. . . . The court has indicated that it will speed oral arguments in New Deal cases. . . .

▼ ▼ ▼

Labor Board in Operation Soon

Administration of the Wagner-Connery labor disputes act will get under way this week. Chairman J. Warren Madden and Edwin S. Smith are awaiting the arrival of the third member, John M. Carmody, who is expected to return to Washington on Thursday. The board will then meet and prepare to put the act into effect. The legal staff has been engaged in examining the act preparatory to issuance of instructions on procedure and policy which will be sent to the board's 17 regional offices.

The board has announced that the 17 regional directors, covering the entire country, will be assembled in Washington soon after Mr. Carmody's arrival. These directors handled cases for the former National Labor Relations Board. All cases before them, however, were automatically dropped upon expiration of the board, which was disbanded when the Supreme Court held the NRA unconstitutional. The board operated under funds from NRA.

While it is expected that the same regional offices will hear complaints charging unfair labor practices filed under the new act, the procedure of receiving and acting upon complaints will have to be set by the new board in conformity with the Wagner-Connery act. The Washington meeting of the regional directors will therefore have to precede active operations in the various districts.

"The National Labor Relations Board is a review body," according to an official announcement. "Complaints of interference with the workers' right to self-organization and collective bargaining, and petitions to supervise elections to determine majority representation—the issues to which the National Board is limited—will be filed locally with the proper regional board and will be heard there. Under the former National Labor Relations Board the great majority of cases were settled locally without reference to Washington. Appeals from the regional board decisions are normally the only matters entertained by the national board.

"Several charges of violations of the Wagner law have already been presented to the National Labor Relations Board. Those will be sent to the appropriate regional boards and action upon them will be initiated as soon as procedure is established. The board has announced that its regional board probably would be organized to conduct actual hearings as soon as the regional directors can reach their districts following the Washington meeting, or about Sept. 15."

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Equipment Eligibility Booklet Issued by FHA

The Federal Housing Administration has outlined the policy it will follow in regard to the eligibility of equipment and machinery obtained under the modernization credit plan in a booklet just released.

The booklet lists types of equipment and machinery that have been ruled eligible for loans up to $50,000 for apartment houses, multiple family houses (two or more separate dwelling units under the same roof), hotels, office, business or other commercial buildings, hospitals, colleges, orphanages, schools, and manufacturing or industrial plants. It also gives the policy, in detail, in regard to loans up to $2,000 on other types of property.

Copies are available at the Federal Housing Administration at Washington, and at State and district insuring offices.

General principles which govern the housing administration's determination of eligibility for equip-

ment and machinery are explained in detail. Salient points on eligibility are:

The article should have a unit value sufficient to justify the application of time payments to its purchase. (It is suggested that loans should not be for periods that make any monthly payment less than $5).

The article should be of a durable nature with a reasonable expectancy of useful life longer than the term of credit extended for its payment. It must be purchased and installed as a part of the equipment of the structure, or of the business conducted therein, within the United States or its territories or possessions.

Hand tools, small portable appliances, fragile articles, furniture (unless built in) furnishings, removable decorations, installations meant to be or by their character necessarily temporary, are ineligible.

Loans for the purchase and installation of replacement parts for eligible equipment and machinery are insurable but a loan merely for the repair of a machine is not insurable. For instance, the cost of welding a flywheel may not be made the basis of an insured loan, but the purchase price and installation cost of a new flywheel would be insurable.

Appurtenances that are physically separate from a major eligible unit but are usable only as a part of such unit, are themselves eligible.

Any item, ineligible because of some disqualifying characteristic, does not become eligible merely because it can be used with an eligible item or is bought therewith.

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Labor Board May Figure in In Ship Awards

Pointing out at a press conference last Friday that awards for 13 naval vessels on which private shipbuilding yards have submitted bids may not be made for possibly a week, President Roosevelt said he was planning to make use of the services of the new National Labor Relations Board in event construction is delayed by labor troubles. He indicated that abandonment of a compulsory strike labor clause had been forced by the unanimous objection of six bidders and said the board would make certain the right of labor to bargain collectively. The Navy Department, it was stated, would determine whether shipbuilders could avoid a strike, and if so, continuance of the policy with relation to cancellation of contract would be followed. Meanwhile, it was stated, it is not possible to say what navy yards will build the remaining 11 ships carried in the navy building program.

Carpenter Steel Co., Reading, Pa., announces that its books will open Sept. 3 for fourth quarter business on high-speed, carbon and alloy tool steels with no changes in the base prices or extras.

Steel Companies Watch Early Test Of Guffey Bill's Constitutionality

WASHINGTON, Sept. 4.—Steel companies owning coal mines are awaiting with keen interest the outcome of the suit filed last Saturday in the Supreme Court of the District of Columbia to test the constitutionality of the Guffey-Snyder coal control act. Steel producers are among its bitterest opponents. They have not only insisted that the legislation is unconstitutional, but have urged that captive mines should be excluded from provisions of the legislation. The bill is designed to stabilize the commercial coal market, but captive mine owners point out that their coal does not enter these markets and is consumed by the owning steel companies. Steel companies also opposed, together with many operators of commercial mines, particularly those in the South, the control placed in the hands of the United Mine Workers of America through labor provisions of the act. The legislation was sponsored chiefly by President John L. Lewis of the United Mine Workers. It has been described as setting up a little NRA for the coal industry.

The suit was filed by James Walter Carter, president of the Carter Coal Co., Washington, through Frederick H. Wood, New York, nemesis of NRA. Mr. Wood represented the Schecter Poultry Co. before the Supreme Court of the United States when the NRA was held to be unconstitutional. The coal case inevitably will go before the highest court. This has been accepted as a matter of course ever since the President urged passage of the Guffey-Snyder bill regardless of doubts "however reasonable" as to its constitutionality. If the suit was a surprise to the Administration it was only because of the swiftness of its filing. It was taken to the court within 24 hours after the act was signed by the President. Ceremony marked the proceeding. Surrounding the President were Mr. Lewis and legislative sponsors of the legislation. Each was presented with one of the different pens used to sign the bill.

Decisions Will Be Rushed

Inasmuch as justices of the Supreme Court have indicated the court will pass on numerous tests of New Deal legislation as speedily as judicial consideration warrants, it is expected the coal case will be decided at a comparatively early date. The court convenes Oct. 7, and it is believed this case will be passed upon by the District Court in time for appeal to the Supreme Court at its forthcoming session.

In filing the suit, Mr. Wood asked for a preliminary injunction to prohibit collection of a tax authorized by the act. The act, as a means to compel compliance with the so-called code, carries a 15 per cent sales tax on producers. Those who comply with the "code" will be granted a 90 per cent drawback. Those who do not comply will have to pay the full 15 per cent on sales. Those who comply with the code are assessed only 1½ per cent of gross sales.

The President said he would name members of the bituminous coal commission set up under the act about Sept. 15. While funds for administration were provided in the third deficiency bill which failed of passage, the President said he thought he could arrange for funds for administration of the act until Congress meets in January and that he thought employees could be transferred from the Department of Labor and possibly from NRA.

Mr. Wood, who said he thought the coal case would be much easier than the Schecter case, charged that the Guffey-Snyder act attempts to subject the coal industry to Federal regulation of a character similar to that attempted to be imposed upon all industry by NRA by means of the 15 per cent sales tax. Because of the penalty that would be laid upon non-code members, it was declared that it was obvious they could not compete successfully with code members.

Chief Justice Wheat of the District Court signed an order requiring defendants in the case, including the Carter Coal Co., and Government officials, to show cause why a preliminary injunction should not be granted. The order is returnable Sept. 16, the date when the so-called truce of the United Mine Workers expires. Wage and hour negotiations will be resumed Sept. 5.

Mr. Carter caused the suit to be instituted because he opposed the Guffey-Snyder act while his associates agreed to comply with it. Hence the suit was directed against the Carter Coal Co., as well as against Internal Revenue Commissioner Guy T. Helvering, Internal Revenue officials in the

Washington area, Attorney General Homer S. Cummings, Solicitor General Stanley Reed, United States Attorney Leslie C. Garnett and United States Marshall John B. Colpoys.

Difficulties of Defining Limitations of Wagner Act Outlined By Madden

WASHINGTON, Sept. 4.—The difficulty of defining limitations of the Wagner-Connery labor disputes act was made evident by Chairman J. Warren Madden of the National Labor Relations Board in a radio broadcast Sunday night. Although set up to deal with labor relations, Mr. Madden pointed out that the board's powers are expressly limited to the prevention of unfair labor practices "affecting commerce," and "commerce" is expressly defined as interstate or foreign commerce, except as to territories and the District of Columbia.

The emphasis Mr. Madden gave to the limitations of the commerce clause of the constitution was interpreted to mean that in framing its policy of procedure at a meeting in Washington this week, the board will seek to avoid the difficulties of preceding labor boards insofar as possible. It is realized that the Wagner-Connery act is inevitably to be tested in the courts and that one of the chief points of challenge will be its power to pass upon labor questions which opponents will insist do not affect interstate commerce.

Broad Powers Mentioned

At one point in his address, however, Mr. Madden indicated the belief that the board will have rather broad powers. This was brought out when he explained that the commerce clause "as interpreted by the Congress and the courts proved to be a very broad grant of power." Nevertheless, he gave recognition to the board's limitations when he stated that "the question of defining this boundary which marks the limits of the Federal power has always been a difficult one for the Congress and the Courts, and its answer in any case is dependent upon a combination of historical facts, precedents and the practical consideration of the situation."

The preamble of the act has been criticized as an effort to fix unjustified principles of law for the purpose of overcoming restrictions of the commerce clause. In outlining the purposes of the act, Mr. Madden pointed out that it recognizes the right of a group of laborers or other employees to join their forces in what they conceive to be their common cause and to authorize one or more representatives to speak for them as a group. Approving this principle, he said that it is a recognition that is "perfectly lawful for such a group to apply to their industrial relations the principle of representation upon which our American state and national governments are founded."

The act, he said, recognizes also that in the past, certain employers have not permitted their employees to enjoy the right to organize and enjoy the right of collective bargaining, but have "by a variety of means prevented them from doing so." It was explained that the statute names some of these means and calls them "unfair labor practices." He listed some of these practices, including the one barring an employer from paying expenses of an organization of employees or paying employees for the time spent in obtaining members or attending meetings of such organization. This particular provision is aimed to strike directly at so-called company unions and was urgently insisted upon by the American Federation of Labor in sponsoring the Wagner-Connery act.

Strike Causes Analyzed

Mr. Madden said that "it is a demonstrated fact that many labor disturbances are caused by these unfair practices. A recent study of strikes in manufacturing industries during the period from January through April, 1935, shows that in more than 45 per cent of the strikes occurring during that period the major issue was either recognition of the employees' chosen representatives for the purpose of collective bargaining or discrimination against employees because of their union activity or a combination of both these causes. Congress rightly thought that the way to attack an evil consequence is to strike at its cause, and has struck at these unfair practices by setting up machinery intended to prevent them."

If the board finds that an employer is indulging in such practices, Mr. Madden said, it may order him to "cease and desist" and to take such affirmative action, including the reinstatement of employees with or without back pay "as will effectuate the policies of the act." If an employer does not obey such an order, it was pointed out, the board is given authority to proceed in the Federal courts to obtain enforcement.

Will Conduct Elections

Indicating that the board may adopt the procedure of the Federal Trade Commission, Mr. Madden said that one of its important functions will be to conduct elections among employees. Referring to the fact that the act provides for majority rule in collective bargaining, Mr. Madden said that where there is a dispute as to which of two contending parties really has the majority, the board may arrange for a vote on the question. The act, it was stated, is by no means directed at all the conditions which cause labor trouble, but is aimed merely at those practices which involve a violation of the rights of self-organization and collective bargaining.

"It has happened, and will happen again," said Mr. Madden, "that strong labor organizations have demanded more than their employers could allow, and that damage to both parties and the public has resulted. It has happened that strong employers, dealing with employees individually or with a weak organization, have imposed wages, hours or conditions damaging to the workers, the community and indirectly to the employers themselves. The act contemplates a process of bargaining between parties of more nearly equal strength, trained in moderation by the exercise of the practices of democracy, which should, in the generality of cases, result in a moderate bargain, fair to the parties and beneficial to the public."

Limitation by Commerce Clause

In pointing to limitations of the board, however, Mr. Madden cautioned that its power will not apply to a number of situations where there are unfair labor practices but where those practices do not affect or tend to create a situation which will affect the free flow of commerce.

"The administration of the new act will present new and difficult problems," said Mr. Madden. "My associates and myself will devote to those problems such skill and wisdom as nature and our previous training may have given us. Our hope is that we may measurably effectuate the laudable purposes of this statute."

August Pig Iron Output Up 15.9 Per Cent

PRODUCTION of coke pig iron in August totaled 1,761,286 gross tons, compared with 1,520,263 tons in July. The daily rate in August, at 56,816 tons, increased 15.9 per cent over the July rate of 49,041 tons.

There were 98 furnaces in blast on Sept. 1, making iron at the rate of 56,430 tons a day, against 95 furnaces on Aug. 1, making iron at the rate of 50,635 tons a day. Nine furnaces were blown in during the month and six were blown out or banked. The Steel Corporation blew three furnaces in and took two off blast, independent steel companies put three in operation and blew out or banked one, and three merchant furnaces were placed in operation and the same number blown out or banked.

Among the furnaces blown in are the following: One Isabella, Carnegie Steel Co.; one South Chicago (new), Illinois Steel Co.; one Fairfield, Tennessee Coal, Iron & Railroad Co.; one Eliza, Jones & Laughlin Steel Corpn.; Niagara, Tonawanda Iron Corpn.; Shenango, Shenango Furnace Co.; Riverside, Wheeling Steel Corpn.; one Hubbard and No. 1 Indiana Harbor, Youngstown Sheet & Tube Co.

Furnaces blown out or banked included the Standish furnace, of the Chateaugay Ore & Iron Co.; Anna, Struthers Iron & Steel Co.; one Mingo, Carnegie Steel Co.; one Toledo, Pickands, Mather & Co.; one South Chicago (old), Illinois Steel Co., and No. 2 Indiana Harbor, Youngstown Sheet & Tube Co.

Daily Average Production of Coke Pig Iron

Gross Tons

	1935	1934	1933	1932
January	47,656	39,201	18,348	31,380
February	57,448	45,131	19,798	33,251
March	57,098	52,243	17,484	31,201
April	55,449	57,561	20,787	28,430
May	55,713	65,900	28,621	25,276
June	51,750	64,338	42,166	20,935
½ year	54,138	54,134	24,536	28,412
July	49,041	39,510	57,821	18,461
August	56,816	34,012	59,142	17,115
September	.....	29,935	50,742	19,753
October	.....	30,679	43,754	20,800
November	.....	31,898	36,174	21,042
December	.....	33,149	38,131	17,615
Year	.....	43,592	36,199	23,733

Production of Coke Pig Iron and Ferromanganese

Gross Tons

	Pig Iron*		Ferromanganese†	
	1935	1934	1935	1934
January	1,477,336	1,215,226	10,048	11,703
February	1,608,552	1,263,673	12,288	10,818
March	1,770,028	1,619,534	17,762	17,605
April	1,663,475	1,726,851	18,302	15,418
May	1,727,095	2,042,896	17,541	10,001
June	1,552,514	1,930,133	12,961	10,007
½ year	9,799,000	9,798,313	88,902	75,642
July	1,520,263	1,224,826	13,175	10,188
August	1,761,286	1,054,382	12,735	8,733
September	.....	898,043	.....	7,100
October	.....	951,062	.....	9,830
November	.....	956,940	.....	8,134
December	.....	1,027,622	.....	4,563
Year	.....	15,911,188	.....	124,190

*These totals do not include charcoal pig iron. The 1933 production of this iron was 32,941 gross tons.
†Included in pig iron figures.

Production by Districts and Coke Furnaces in Blast

Furnaces	Production (Gross Tons) August (31 Days)	Production (Gross Tons) July (31 Days)	September 1 Number in Blast	September 1 Operating Rate, Tons a Day	August 1 Number in Blast	August 1 Operating Rate, Tons a Day
New York:						
Buffalo	115,579	109,772	7	3,730	6	3,540
Other New York and Mass.	13,121	6,248	1	345	2	365
Pennsylvania:						
Lehigh Valley	32,484	29,521	3	1,050	3	950
Schuylkill Valley	12,010	12,309	1	385	1	395
Susquehanna and Lebanon Valleys	13,019	12,474	1	420	1	400
Ferromanganese	....	....	0	....	0	....
Pittsburgh District	359,205	279,481	20	11,705	17	9,895
Ferro. and Spiegel.	4,311	12,706	1	140	2	410
Shenango Valley	22,335	18,782	2	945	1	605
Western Pennsylvania	39,647	25,517	2	1,280	2	825
Ferro. and Spiegel.	5,409	5,950	1	175	1	190
Maryland	75,513	57,702	3	2,435	3	1,860
Wheeling District	125,774	114,840	6	3,975	6	3,705
Ohio:						
Mahoning Valley	182,361	172,372	8	5,840	8	5,215
Central and Northern	178,459	158,162	10	5,370	11	5,375
Southern	32,187	28,999	2	1,040	2	935
Illinois and Indiana	349,673	285,159	15	10,645	15	10,385
Mich. and Minn.	68,701	57,788	4	2,215	4	1,865
Colo., Mo. and Utah	23,171	19,904	2	745	2	640
The South:						
Virginia	....	....	0	....	0	....
Ferro. and Spiegel.	3,015	2,851	1	95	1	90
Kentucky	25,215	24,866	2	815	2	800
Alabama	80,097	84,860	6	3,080	5	2,190
Tennessee	....	....	0	....	0	....
Total	1,761,286	1,520,263	98	56,430	95	50,635

An Explanation

A CALIFORNIA subscriber writes:

"I am writing this in protest to your editorial of Aug. 22, as a member of the steel industry, as a subscriber to The Iron Age and as a son of an Irish father and mother and very proud of the name Pat.

Your comparison with business and Pat's wife indicates a paucity of ideas and perhaps a racial prejudice. You infer by your statement that the Irish are a wife-beating race.

If it is not your wish to traduce the Irish people I request that you apologize for your statement . . ."

No slur was intended. We plead not guilty to the charge of possible racial prejudice. The familiar story was used simply to illustrate a point.—Editor.

Capital Goods Index Higher in

OPERATIONS in the capital goods industries last week, as measured by THE IRON AGE index, fell beneath the rate of activity for the week preceding, but as it became necessary to revise the index for that period upward, the current estimated showing of 57.2 is still relatively strong. Both steel output and automobile production registered slight declines for the week, the percentage loss being approximately equal in each case. Construction contract awards, too, were down somewhat, though gains occurred in the remaining series.

On the whole, August was a better month than either June or July. The adjusted index shows that, with respect to activity in the base period, an average rate of 56.9 prevailed during August as against 54.2 for July and 54.9 for June. During August of 1934 the rate was only 49.2, or nearly 16 per cent lower.

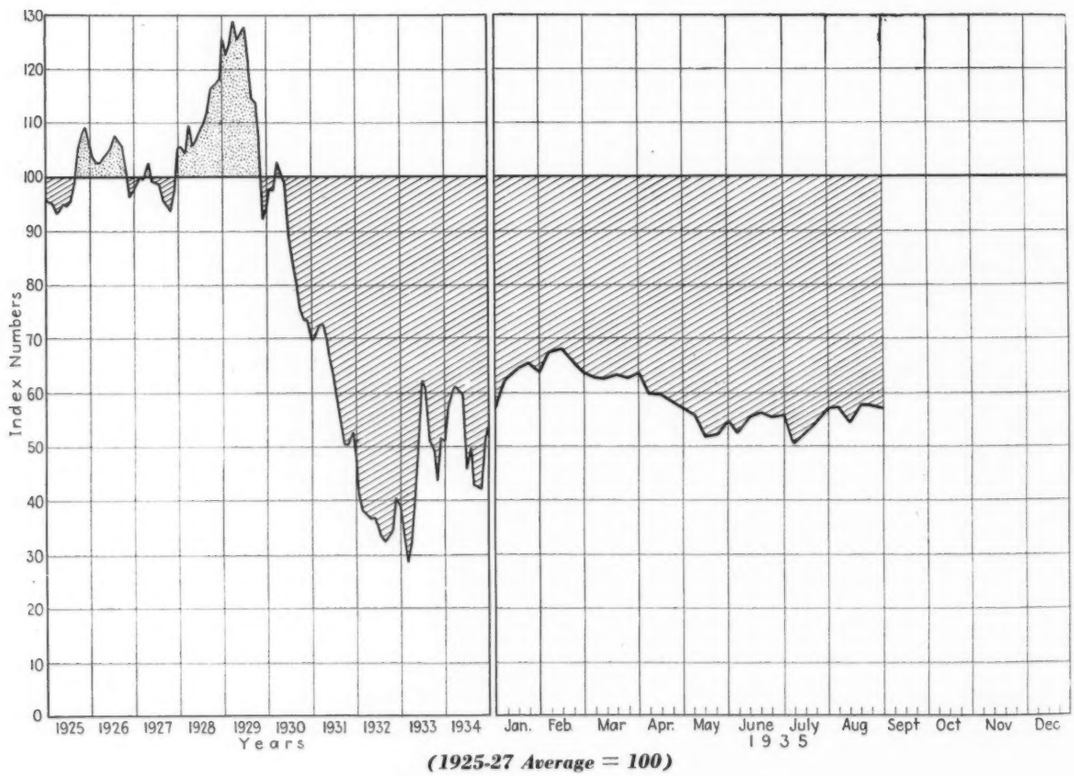
The Iron Age Weekly Index Numbers of Capital Goods Activity

(1925-'27 = 100)

Last week (est.)	57.2
Preceding week (rev.)	57.7
Same week last month	57.7
Same week 1934	39.9
Same week 1933	53.4
Same week 1932	32.2
Same week 1931	57.0
Same week 1930	83.8
Same week 1929	120.1

Capital Market More Active

Sales of corporate securities, particularly issues sold for the purpose of raising new capital, provide one measure of the extent to which savings are being "spent" for industrial capital goods, just as department store sales are an indicator of expenditures for consumers' goods. New security issues, of course, are not the only measure of capital goods purchases. Buying power for capital goods arises also from corporation



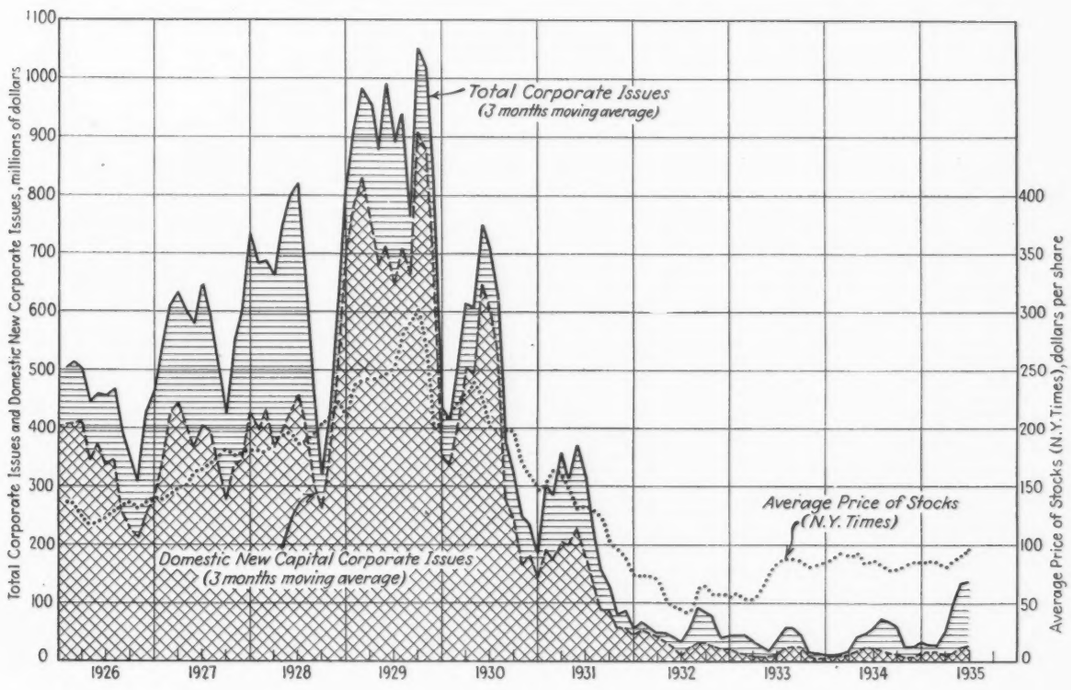
The Iron Age Index of Capital Goods Activity. The years 1925 to 1934 are plotted by months, the current year by weeks.

August Than in July or June

surpluses, from mortgages and securities sold privately, from Government funds obtained by taxation and bond issues, and from direct expenditures of individuals and institutions.

The trend of total corporate capital issues and of the new capital issues of domestic corporations is shown in the chart at the bottom of the page in comparison with the average price of common stocks as measured by the New York *Times* index. All of these series have been plotted on a monthly basis since 1926, but the erratic fluctuations in capital issues have been smoothed out by the use of a three-month moving average. One reason for the failure of the capital goods industries to share fully in the recovery of business since 1932 is to be found in the extremely low volume of new securities, and particularly of new capital issues floated during the past four years. After reaching a peak in 1929, with the volume in September of that year in excess of $1,500,000,000 and the total for the year more than $10,000,000,000, the volume fell sharply until the latter part of 1931, reaching a rock bottom close to zero, where it remained for the next three years. The recent upturn is encouraging, not only because the volume for the last three months was larger than for any other three-month period since 1931 but because the betterment has been accompanied by a feeling of greater confidence manifested by a sustained rise in the price of industrial stocks.

To a considerable extent, however, the recently increased volume has consisted of the refunding of bond issues stimulated by low interest rates and also by more reasonable registration requirements promulgated by the Securities and Exchange Commission. The volume of domestic corporate new capital issues has also increased but is still in no greater volume than at other times during the past three years. Until there is a substantial increase in the volume of investment funds going into new capital issues a marked expansion of business enterprise cannot be expected. That the capital goods industries have already shown appreciable improvement is to be attributed very largely to expenditures of corporate surpluses for maintenance and renovation programs and not to the expansion of existing facilities and the launching of new industrial enterprises.



Corporate Security Issues

Sources: ***Commercial and Financial Chronicle,*** **statistics obtained from the** ***Survey of Current Business.***

Current Metal Working Activity Statistically Shown

These Data Are Assembled By THE IRON AGE from Recognized Sources And Are Changed Regularly As More Recent Figures Are Made Available

	July, 1935	June, 1935	July, 1934	Seven Months, 1934	Seven Months, 1935
Raw Materials:					
Lake ore consumption (gross tons)[a]	2,198,189	2,198,757	1,599,865	15,322,984	16,539,702
Coke production (net tons)[b]	2,612,411	2,660,113	2,432,000	20,021,203	19,635,159
Pig Iron:					
Pig iron output—monthly (gross tons)[c]	1,520,263	1,552,514	1,224,826	11,023,139	11,319,263
Pig iron output—daily (gross tons)[c]	49,041	51,750	39,510	51,996	53,393
Castings:					
Malleable castings—production (net tons)[d]	28,915	27,548	23,388	237,429	260,812
Malleable castings—orders (net tons)[d]	31,111	25,668	21,862	229,509	268,468
Steel castings—production (net tons)[d]	.....	27,665	46,182	295,666	.....
Steel castings—orders (net tons)[d]	.....	30,257	41,822	315,372	.....
Steel Ingots:					
Steel ingot production—monthly (gross tons)[e]	2,270,224	2,230,893	1,489,453	17,892,007	18,294,915
Steel ingot production—daily (gross tons)[e]	87,316	89,236	59,578	98,851	101,077
Steel ingot production—per cent of capacity[e]	39.44	40.31	27.06	44.79	45.70
Employment in Steel Industry:					
Total employees[e]	415,937	416,732	424,126	425,161	418,776
Total payrolls (thousands of dollars)[e]	$42,725	$41,903	$34,913	$293,314	$336,039
Average hours worked per week[e]	31.5	31.4	24.4	32.9	33.4
Finished Steel:					
Trackwork shipments (net tons)[e]	4,054	4,210	5,226	33,873	25,629
Sheet steel sales (net tons)[f]	206,313	128,957	72,517	1,258,161	1,351,298
Sheet steel production (net tons)[f]	145,505	143,309	85,286	1,334,517	1,371,396
Fabricated shape orders (net tons)[g]	57,556	122,393	75,257	670,445	575,463
Fabricated shape shipments (net tons)[g]	94,733	89,759	103,010	565,081	599,392
Fabricated plate orders (net tons)[d]	.....	17,914	12,523	151,356	.....
Reinforcing bar awards (net tons)[e]	.....	14,985	14,595	125,480	.....
U. S. Steel Corpn. shipments (tons)[h]	547,794	578,108	369,938	4,048,833	4,101,793
Ohio River steel shipments (net tons)[i]	77,464	80,620	60,005	396,437	486,112
Fabricated Products:					
Automobile production, U. S. and Canada[k]	350,118	377,065	276,047	2,072,394	2,723,589
Construction contracts, 37 Eastern States[l]	$159,249,900	$148,005,200	$119,662,300	$973,764,200	$855,756,700
Steel barrel shipments (number)[d]	.....	501,730	608,644	4,434,758	.....
Steel furniture shipments (dollars)[d]	.....	$1,137,173	$863,439	$6,700,150	.....
Steel boiler orders (sq. ft.)[d]	519,061	391,497	385,218	2,301,268	3,190,086
Locomotive orders (number)[m]	.....	3	0	83	.....
Freight car orders (number)[m]	.....	5,151	0	23,383	.....
Machine tool index[n]	119.8	91.1	34.7	†38.6	94.7
Foundry equipment index[o]	93.3	100.1	50.7	†62.5	†98.3
Foreign Trade:					
Total iron and steel imports (gross tons)[p]	.....	33,208	17,676	185,314	.....
Imports of pig iron (gross tons)[p]	5,519	6,583	2,997	68,383	59,005
Imports of all rolled steel (gross tons)[p]	.....	19,678	10,900	66,863	.....
Total iron and steel exports (gross tons)[p]	296,802	289,687	233,197	1,486,367	1,892,736
Exports of all rolled steel (gross tons)[p]	83,171	65,319	74,536	569,299	494,484
Exports of finished steel (gross tons)[p]	68,129	60,643	64,216	493,759	433,234
Exports of scrap (gross tons)[p]	205,779	215,098	155,812	894,660	1,321,721
British Production:					
British pig iron production (gross tons)[r]	547,300	529,300	528,300	3,426,700	3,719,300
British steel ingot production (gross tons)[r]	803,300	770,000	718,200	5,225,500	5,604,500
Non-Ferrous Metals:					
Lead production (net tons)[s]	34,424	33,002	31,881	245,578	226,540
Lead shipments (net tons)[s]	34,575	26,978	29,479	207,923	229,994
Zinc production (net tons)[t]	35,055	34,677	24,756	208,764	245,042
Zinc shipments (net tons)[t]	32,241	29,393	26,966	216,862	247,324
Deliveries of tin (gross tons)[v]	5,290	4,615	3,575	26,020	33,680

*Preliminary. †Three Months' Average.

Source of figures: [a] Lake Superior Iron Ore Association; [b] Bureau of Mines; [c] THE IRON AGE; [d] Bureau of the Census; [e] American Iron and Steel Institute; [f] National Association of Flat-Rolled Steel Manufacturers; [g] American Institute of Steel Construction; [h] United States Steel Corpn.; [i] United States Engineer, Pittsburgh; [k] When preliminary, from Automobile Manufacturers Association—Final figures from Bureau of the Census; [l] F. W. Dodge Corpn.; [m] *Railway Age;* [n] National Machine Tool Builders Association; [o] Foundry Equipment Manufacturers Association; [p] Department of Commerce; [r] British Iron and Steel Federation; [s] American Bureau of Metal Statistics; [t] American Zinc Institute, Inc.; [v] New York Commodities Exchange.

SUMMARY OF THIS WEEK'S BUSINESS

Pig Iron Production Registers 15.9 Per Cent Gain in August

Ingot Output Recovers From Holiday Influence, Rising One-Half Point Above Last Week's Rate to 50½ Per Cent—Scrap Trends Conflicting

PIG IRON production in August totaled 1,761,286 tons, compared with 1,520,263 tons in July. The daily average in August, at 56,816 tons, registered a gain of 15.9 per cent over the July daily rate of 49,041 tons. Ninety-eight furnaces were in blast Sept. 1, as against 95 one month previous, a net gain of three.

CURRENT steel ingot production, at 50½ per cent of capacity, is one-half point higher than a week ago and fully abreast of the rate in the third full week of August. Thus the holiday's depressing effect on operations has proved to be of short duration. Gains of five points to 77 per cent in the Wheeling district, two points to 60 per cent in the Valleys, two points to 45 per cent in the Cleveland-Lorain area and eight points to 46 per cent in the South indicate that the renewed upward trend is not localized. The only center to report a loss is Buffalo, where operations have receded from 38 to 32 per cent. Elsewhere production is substantially unchanged.

Finishing mill operations were more sensitive to the holiday interruption than raw steel production. Tin plate output has dropped 15 points to 55 per cent of capacity, but this decline is partly due to seasonal influences. Sheet mill operations have fallen 10 points to 60 per cent, but an early rebound is looked for.

Output will soon get added support from the automobile industry. Though September will probably be the low month of the year for motor car assemblies, this will not be true of steel orders. Several sizable releases of sheets and strips, held up during vacation shutdowns at a number of automotive plants, have now been issued, and a fair volume of new business, though still for small tonnages, has been placed for delivery through October. Parts makers, especially forging plants, have increased their specifications, and general acceleration of the flow of automotive steel is assured as the time for getting under production on new models draws near.

THE opening of iron and steel makers' books for fourth quarter has not stimulated buying except in cases where users can profit by taking advantage of existing prices. Thus there has been an improved demand for forging billets, which were recently advanced, and for hot-rolled bars, on which the base size range was narrowed and new quantity differentials were announced. The new quantity discounts and extras on bars are accompanied by a $1 a ton advance in the base price. However, the new price schedule will represent a reduction on orders of 100 tons or more, which carry a quantity discount of $2 a ton, or $1 a ton below the previously prevailing base price.

The elimination of the $2 a ton discount on galvanized sheets to jobbers and roofing manufacturers, to become effective Oct. 1, is expected to result in considerable stocking this month by the interests affected.

Railroad axles have been advanced $3 a ton to 2.80c. a lb., Pittsburgh or Chicago, but no other price changes have been reported. However, producers of wire products, in reaffirming present prices for fourth quarter, withheld announcements on rods and cold-finished bars. The advance in hot-rolled bars is believed to be a certain precursor of an increase in cold-finished bar prices.

IN the pig iron market interest in forward needs has been stimulated, not by advances for fourth quarter but by the expectation that prices will rise before the quarter is over. Higher producing costs are regarded as the inevitable sequel of enactment of the Guffey bill, though court action to contest the constitutionality of the act has already been instituted by a coal operator.

The scrap market continues to show strength in all sections of the country except Chicago, where a sharp increase in country offerings has caused prices to soften. A decline in heavy melting steel in that center has offset an advance at Pittsburgh, leaving THE IRON AGE scrap composite unchanged at $12.58 a ton.

An award of 83,790 tons of reinforcing steel has been divided among seven distributers by the Los Angeles water district, subject to Federal approval. Deliveries are to extend until January, 1939. Successful bidders have been tentatively instructed to place orders totaling 32,180 tons among five designated mills.

Definite authorization of a 24-in. gas line from Dana, Ind., to Detroit, will shortly bring 75,000 tons of steel into the market.

THE IRON AGE composite prices for finished steel and pig iron are unchanged at 2.124c. a lb. and $17.84 a gross ton respectively.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous; Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

Per Gross Ton:	Sept. 4, 1935	Aug. 27, 1935	Aug. 6, 1935	Sept. 5, 1934
No. 2 fdy., Philadelphia	$20.3132	$20.3132	$20.3132	$20.26
No. 2, Valley furnace	18.50	18.50	18.50	18.50
No. 2 Southern, Cin'ti	19.2007	19.2007	19.2007	19.13
No. 2, Birmingham†	14.50	14.50	14.50	14.50
No. 2 foundry, Chicago*	18.50	18.50	18.50	18.50
Basic, del'd eastern Pa	19.8132	19.8132	19.8132	19.76
Basic, Valley furnace	18.00	18.00	18.00	18.00
Malleable, Chicago*	18.50	18.50	18.50	18.50
Malleable, Valley	18.50	18.50	18.50	18.50
L. S. charcoal, Chicago	24.2528	24.2528	24.2528	24.04
Ferromanganese, seab'd carlots	85.00	85.00	85.00	85.00

†This quotation is for delivery in South; in the North prices are 38c. a ton under delivered quotations from nearest Northern furnace.

*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Rails, Billets, etc.

Per Gross Ton:				
Rails, heavy, at mill	$36.37½	$36.37½	$36.37½	$36.37½
Light rails, Pittsburgh	35.00	35.00	35.00	35.00
Rerolling billets, Pittsburgh	27.00	27.00	27.00	27.00
Sheet bars, Pittsburgh	28.00	28.00	28.00	28.00
Slabs, Pittsburgh	27.00	27.00	27.00	27.00
Forging billets, Pittsburgh	35.00	35.00	32.00	32.00
Wire rods, Pittsburgh	38.00	38.00	38.00	38.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.70	1.70	1.70	1.70

Finished Steel

Per Lb.	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.80	1.80	1.80	1.80
Bars, Chicago	1.85	1.85	1.85	1.85
Bars, Cleveland	1.85	1.85	1.85	1.85
Bars, New York	2.15	2.15	2.15	2.13
Plates, Pittsburgh	1.80	1.80	1.80	1.80
Plates, Chicago	1.85	1.85	1.85	1.85
Plates, New York	2.09	2.09	2.09	2.08
Structural shapes, Pittsburgh	1.80	1.80	1.80	1.80
Structural shapes, Chicago	1.85	1.85	1.85	1.85
Structural shapes, New York	2.06¼	2.06¼	2.06¼	2.05¼
Cold-finished bars, Pittsburgh	1.95	1.95	1.95	2.10
Hot-rolled strips, Pittsburgh	1.85	1.85	1.85	1.85
Cold-rolled strips, Pittsburgh	2.60	2.60	2.60	2.60

Finished Steel

Per Lb.	Sept. 4, 1935 Cents	Aug. 27, 1935 Cents	Aug. 6, 1935 Cents	Sept. 5, 1934 Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.40	2.40	2.40	2.40
Hot-rolled annealed sheets, No. 24, Gary	2.50	2.50	2.50	2.50
Sheets, galv., No. 24, P'gh	3.10	3.10	3.10	3.10
Sheets, galv., No. 24, Gary	3.20	3.20	3.20	3.20
Hot-rolled sheets, No. 10, P'gh	1.85	1.85	1.85	1.85
Hot-rolled sheets, No. 10, Gary	1.95	1.95	1.95	1.95
Wire nails, Pittsburgh	2.40	2.40	2.60	2.60
Wire nails, Chicago dist. mill	2.45	2.45	2.65	2.65
Plain wire, Pittsburgh	2.30	2.30	2.30	2.30
Plain wire, Chicago dist. mill	2.35	2.35	2.35	2.35
Barbed wire, galv., Pittsburgh	2.80	2.80	3.00	3.00
Barbed wire, galv., Chicago dist. mill	2.85	2.85	3.05	3.05
Tin plate, 100 lb. box, P'gh	$5.25	$5.25	$5.25	$5.25

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh	$13.25	$13.00	$12.75	$10.75
Heavy melting steel, Phila	12.00	12.00	11.00	9.75
Heavy melting steel, Ch'go	*12.50*	12.75	11.75	8.75
Carwheels, Chicago	12.75	12.75	12.25	9.50
Carwheels, Philadelphia	11.75	11.75	11.25	11.25
No. 1 cast, Pittsburgh	14.25	14.25	13.50	11.75
No. 1 cast, Philadelphia	11.75	11.75	11.25	11.75
No. 1 cast, Ch'go (net ton)	11.00	11.00	10.50	8.00
No. 1 RR. wrot., Phila.	**12.25**	11.75	10.25	11.25
No. 1 RR. wrot., Ch'go (net)	9.50	9.50	9.50	7.25

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$3.25	$3.25	$3.40	$3.85
Foundry coke, prompt	4.00	4.00	4.00	4.60

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, refinery	8.25	8.25	7.75	8.75
Lake copper, New York	8.62½	8.62½	8.12½	9.12½
Tin (Straits), New York	*48.62½*	49.25	52.50	51.55
Zinc, East St. Louis	4.60	4.60	4.50	4.20
Zinc, New York	4.97½	4.97½	4.87½	4.55
Lead, St. Louis	4.20	4.20	4.05	3.60
Lead, New York	4.35	4.35	4.20	3.75
Antimony (Asiatic), N. Y.	13.00	13.00	12.75	8.62½

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

The Iron Age Composite Prices

	Finished Steel	Pig Iron	Steel Scrap
Sept. 4, 1935	2.124c. a Lb.	$17.84 a Gross Ton	$12.58 a Gross Ton
One week ago	2.124c.	17.84	12.58
One month ago	2.124c.	17.84	11.83
One year ago	2.124c.	17.90	9.75
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products make 85 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel HIGH	Finished Steel LOW	Pig Iron HIGH	Pig Iron LOW	Steel Scrap HIGH	Steel Scrap LOW
1935	2.124c., Jan. 3;	2.124c., Jan. 8	$17.90, Jan. 8;	$17.83, May 14	$12.58, Aug. 27;	$10.33, April 23
1934	2.199c., April 24;	2.008c., Jan. 2	17.90, May 1;	16.90, Jan. 27	13.00, Mar. 13;	9.50, Sept. 25
1933	2.015c., Oct. 3;	1.867c., April 18	16.90, Dec. 5;	13.56, Jan. 3	12.25, Aug. 8;	6.75, Jan. 3
1932	1.977c., Oct. 4;	1.926c., Feb 2	14.81, Jan. 5;	13.56, Dec. 6	8.50, Jan. 12;	6.43, July 5
1931	2.037c., Jan. 13;	1.945c., Dec. 29	15.90, Jan. 6;	14.79, Dec. 15	11.33, Jan. 6;	8.50, Dec. 29
1930	2.273c., Jan. 7;	2.018c., Dec. 9	18.21, Jan. 7;	15.90, Dec. 16	15.00, Feb. 18;	11.25, Dec. 9
1929	2.317c., April 2;	2.273c., Oct. 29	18.71, May 14;	18.21, Dec. 17	17.58, Jan. 29;	14.08, Dec. 3
1928	2.286c., Dec. 11;	2.217c., July 17	18.59, Nov. 27;	17.04, July 24	16.50, Dec. 31;	13.08, July 2
1927	2.402c., Jan. 4;	2.212c., Nov. 1	19.71, Jan. 4;	17.54, Nov. 1	15.25, Jan. 11;	13.08, Nov. 22

Production Gains in Tri-State Area

Pittsburgh Rate Unchanged at 44 Per Cent, But Valley and Wheeling Rates Rise—Scrap Advances

PITTSBURGH, Sept. 4.—Steel activity has lost no momentum despite the holiday this week, and losses sustained in operating schedules on Monday, in most instances, will have been recouped by the end of the current period. At Pittsburgh, increased output by the leading producer is the major support to unchanged operations for the district at 44 per cent of capacity. A spurt in plate tonnage and fairly steady rollings of piling, structural steel and semi-finished grades are contributing factors in the steadiness of raw steel production.

Holiday shutdowns will result in lower finishing mill schedules this week, with sheet production dropping 10 points to 60 per cent, and tin plate output falling at least 15 points to 55 per cent. The decline in the tin plate rolling partly reflects a seasonal trend in demand, but the loss in sheet production is almost entirely due to the holiday and not to lighter specifications.

Addition of Bessemer capacity in the Valleys and nearby northern Ohio mills accounts for a two-point increase in raw steel production to 60 per cent. In the Wheeling district output is five points higher at 77 per cent.

The new schedule of quantity extras and deductions on hot-rolled bars initiated by the Carnegie Steel Co. is expected to be followed generally by other hot-rolled producers, although definite announcements have not yet been made. Most steel producers in this district are quoting for fourth quarter delivery, but demand for that period has not yet assumed important volume.

Scrap prices have proved sensitive on small turnovers, and quotations have moved upward 25c. to 50c. a ton at Pittsburgh.

Pig Iron

Prices have been reaffirmed for fourth quarter, with No. 2 foundry and malleable at $18.50, basic at $18 and Bessemer at $19, at Neville Island, Sharpsville and Youngstown. August tonnage reflected a moderate improvement over July business, but furnace backlogs still are extremely thin. The Shenango Furnace Co. blew in its stack at Sharpsville last week.

Semi-Finished Steel

Heavier shipments of sheet bars to non-integrated sheet mills have been offset by declines in the movement to detached tin plate mills. Forging billets are in better demand, while wire rods are enjoying a steady outlet. Most producers are quoting present prices for fourth quarter commitments.

Bolts, Nuts and Rivets

This market still is in the doldrums, with competition unusually keen on what limited tonnage appears. A good deal of uncertainty veils the price situation, and clarification probably will not be made possible until announcement of fourth quarter cards within two or three weeks.

Reinforcing Steel

The new set-up on hot-rolled carbon bars is expected to force a revamping of the method of quoting reinforcing steel. Although no definite plan is reported thus far, it is believed possible that a schedule of quantity differentials, not unlike that covering hot-rolled bars, may solve the problem.

Bars

Hot-rolled bar producers will adopt the new set-up of quantity extras and deductions announced by the Carnegie Steel Co. and published elsewhere in this issue of THE IRON AGE. The advance of $1 a ton in the base price for fourth quarter delivery is expected to drive in a fair amount of anticipatory tonnage. Meanwhile, demand has been in good volume from miscellaneous sources and agricultural implement makers, while forging quality bars are moving more freely to the automotive industry.

Cold-Finished Bars

The net set-up on hot-rolled bars will not affect the new list of extras announced last week on cold-finished bars. It now appears, however, that nonintegrated producers of cold-finished carbon steel bars and shafting will be faced with a substantial increase in costs that will result from the advance in hot-rolled bars, and the probable result will be in an increase in cold-finished carbon bar prices. Whether the change will be effective for fourth quarter or for first quarter still is conjectural, since some producers are already committed on fourth quarter tonnage at the present base of 1.95c., Pittsburgh. No changes in the extras or the base price of 2.95c., Pittsburgh, for alloy cold-finished bars, will be made for fourth quarter delivery.

Tubular Products

Demand in the past week was a shade lighter, but most mills managed to show an improvement in August tonnage over July bookings. No change is noticeable in the trend of demand for any class of tubing, except possibly a slower movement in standard pipe for private construction. Present discounts are being extended for fourth quarter delivery.

Wire Products

The flow of orders from various sources is well sustained. Interest from farm areas is in good evidence, while manufacturers' wire is in fairly strong demand despite no notable increase in automotive specifications. Wire mills in this district are engaged at about 45 per cent of capacity.

Strip Steel

August bookings by producers in this district showed a substantial gain over those for July, and in one instance reflected the best total for any month since April. This record was attained without substantial covering by the automotive industry, which still is slow to specify freely for new model requirements. Encouraging steadiness continues in demand from miscellaneous sources and the farm implement industry. Although strip producers have not publicly announced fourth quarter prices, current prices are being quoted on inquiries for delivery in the final period. Hot-rolled and cold-rolled strip production is running slightly better than 40 per cent.

Sheets

Specifications are in sustained volume, with all consuming lines well represented. Fairly substantial bookings of automotive tonnage have been entered, and orders from drum and barrel makers are heavier. Mill operations this week have been temporarily set back by holiday shutdowns, and a 10-point drop in output to about 60 per cent is not an indication of the trend in

demand. A recovery in output next week is considered assured. Important producers here are quoting present prices on fourth quarter inquiries.

Tin Plate

With specifications in reduced volume, most tin plate producers are operating this week on sharply reduced schedules. Average output for the industry is estimated at 50 to 55 per cent, a drop of at least 15 points from the rate last week. Seasonal behavior probably will force further retrenchments later this month.

Plates and Shapes

The American Bridge Co. has received contract for the construction of 30 cargo barges, requiring 7440 tons of plates and small shapes, for the Mississippi Valley Barge Line, St. Louis. The order is for prompt delivery, and work will be begun immediately. Other plate and shape tonnage reaching this district in the past week was of minor character. New inquiries also are in small volume.

Producers in this district are quoting the present base price of 1.80c., Pittsburgh, for plates and shapes for fourth quarter delivery. The fact that books are opened on that basis for the coming quarter temporarily precludes the reflection of the new set-up on hot-rolled bars that will become applicable on Oct. 1.

Warehouse Business

All base prices remain unchanged. No change in the warehouse base price for soft steel bars to reflect the advance in the mill base on Oct. 1 is in immediate prospect, but changes in size extras will become applicable for fourth quarter delivery.

Coal and Coke

Seasonal demand for domestic sizes of coal and coke is spreading. Interest in industrial sizes, however, is quite meager, with most large buyers still awaiting developments on the Guffey bill, which probably will be lacking for at least six weeks pending formation of an administrative commission. Action against the bill already has been instituted by one coal producer, and the effectiveness of the bill continues to be doubted among some interests in the local fuel trade.

Scrap

Prices have moved generally upward, with advances ranging from 25c. to 50c. a ton. The significance of the current trend is that prices are unusually sensitive to a rather small volume of buying. Only two mills in this district are displaying major interest in steel-making grades. A moderate tonnage of ordinary No. 1 heavy melting steel has been purchased at $13,50, thereby advancing that grade 25c. a ton. Although recent prices realized represent a modification of brokers' asking prices a week or two ago, the market, regardless of meager buying interest, remains strong largely owing to the extremely slow flow of scrap from producing sources. The current Pennsylvania Railroad list, which closes on Sept. 11, covers 19,500 tons, including 7400 tons of No. 1 heavy melting steel. The Baltimore & Ohio list, closing Sept. 9, covers about 3400 tons, including only 600 tons of No. 1 steel.

Barge Contract Is Feature at St. Louis

ST. LOUIS, Sept. 3.—The prices of pig iron of both Northern and Southern make will start off the fourth quarter at unchanged levels, but makers say that it is expected that the prices will advance as the last quarter progresses. Commitments in advance of the opening of the books today were reported to be on a more liberal basis than for some time, and September is expected to be the largest month in sales since last spring. Melters seem to be buying with confidence, the recent steady advances in scrap plus better bookings for finished products tending to create that feeling. August shipments were ahead of July. The stove plants in the Belleville district are running at top speed, and jobbing foundry operations have been stepped up.

The Mississippi Valley Barge Line Co. has given the American Bridge Co. a contract for 30 barges to be built on the Ohio River, requiring approximately 7500 tons of plates and shapes. Work will be started on the barges immediately.

Maxon Construction Co., Dayton, Ohio, is the low bidder on the general contract for dam No. 11 in the Mississippi River at Rock Island, Ill., requiring 2800 tons of structural steel and 735 tons of reinforcing bars. The Missouri Highway Commission will open bids on Friday for the second Lake-of-the-Ozarks bridge, requiring 2100 tons of structural steel. The Illinois Highway Commission has asked for bids Sept. 17 for a bridge over the Illinois River connecting Morgan and Pike counties, requiring 2100 tons of structural steel.

City of St. Louis will offer for sale Sept. 19 $3,500,000 in bonds for the following purposes: additions and improvements to public hospitals, chiefly the construction of a psychopathic building, $1,250,000; construction of Soldiers' Memorial building, $1,000,000; sewer construction, $375,000; additional police stations, $350,000; improvements to Civil Courts building, $250,000; construction of armory for National Guard, $200,000, and improvements to parks and playgrounds, $75,000.

The scrap market is slightly weaker than it has been, although prices are unchanged. The let-down is said to be due to the weakness manifest in Chicago and Eastern markets. There was no buying during the week.

Weekly Indications of Steel Activity

From THE IRON AGE

	Sept. 4, 1935	Aug. 27, 1935	Aug. 6, 1935	Sept. 5, 1934	Average Year to Date 1935	Average Year to Date 1934
Steel ingot operations—Per cent of capacity	50.5	50.0	47.0	19.0	45.7	41.6

	Week Ended Sept. 4, 1935	Aug. 27, 1935	Aug. 6, 1935	Sept. 5, 1934	Year to Date 1935	Year to Date 1934
Fabricated structural steel awards	8,825	12,400	21,450	9,200	463,505	558,020
Fabricated plate awards	12,200	755	7,165	600	100,022	92,137
Sheet steel piling awards	200	0	2,300	0	34,065	42,435
Reinforcing bar awards	87,550	1,360	4,800	1,085	221,540	150,730

Chicago Rate Unchanged At 57 Per Cent

Most Prices Reaffirmed for Fourth Quarter—Construction Tonnage Gains—Pig Iron Contracting Brisk —Scrap Suffers Setback

CHICAGO, Sept. 4.—Minor adjustments in mill operations leave the average output stationary at 57 per cent of capacity. Fresh inquiries and new sales for close-by delivery do not portray any marked swing either one way or the other in the matter of rolling schedules. Probably the most perplexing mill problem at this time is how rail mills can be held to even light schedules for more than two or three weeks. There are no major moves being made by Western railroads in the matter of rail purchases.

All current prices on steel products have been reaffirmed for fourth quarter with the exception of carbon bars, which are being marked up $1 a ton to $1.90 a 100 lb., Chicago, and to which are being applied quantity extras and deductions outside of the range from 10 to 25 tons of a size. Makers of wire products, in carrying present prices forward for the fourth quarter, have withheld announcements on rods and cold-finished bars.

Promising in the matter of large tonnage business is a natural gas line to Detroit, 30 river barges, 6000 tons for dams on the Mississippi River and 4700 tons for two bridges in Illinois. There is also a smattering of small railroad equipment business. The Santa Fe's new 3600-hp. locomotive, built by the Electro-Motive Corpn., was delivered several days ago and is now on trial runs.

The scrap market is weaker, and for no very good reason beyond the fact that material is moving into Chicago from a larger area. No one either in or out of the trade is worried about the current slight setback in prices, since it does not reflect a material change in the steel outlook.

Pig Iron

All prices have been reaffirmed for fourth quarter delivery and there is a rush to cover, the stimulant being that foundrymen know that prices are strong and some of them are quite well convinced that price advances about Oct. 1 are in the realm of possibilities. August shipments topped July by 30 per cent and releases indicate a further rise.

Cast Iron Pipe

Business remains very quiet and the week's volume can be measured by a few carlots. Fresh inquiry is also slow and yet some sellers believe that a break is near and that large tonnages will be shipped later in the year. In any event the character of the early winter will have some bearing on business at that time. A mild winter means that pipe can be laid well into the north even in January and February. In fact contractors favor winter work when practicable for the reason that they avoid the obstacles of heat and wet soggy ground. Prices remain steady.

Reinforcing Bars

Inquiries are in satisfatory volume, but jobs are slow in reaching the contracting stage. About 1300 tons has been placed for the Alton, Ill., dam. Other Mississippi River work is pending and in several instances contractors are still waiting for formal acceptances of their bids. Iowa and Indiana are making progress with road programs, while Illinois and Wisconsin are tardy in getting under way. The price situation changes little from week to week. Mills are holding rigidly to jobbers' schedule, but dealers waver when attractive or needed tonnages appear before them.

Rails

It is reported here that the 1750 tons of rails on inquiry by the Pere Marquette may be used in track in Canada and for that reason most, if not all, of the tonnage may be purchased from mills in that country. In all other respects the rail market is quiet. In past years some of the Western railroads would be counted on by this time to make needs known, but as matters stand now it may be November before inquiries are issued. In the meantime mills continue to produce on light schedules which are arranged to about the middle of the month. Accessory business is light and spotty.

Wire Products

All prices are reaffirmed for fourth quarter deliveries with the exception of rods and cold-finished bars. Output remains at 50 per cent of capacity and current specifications do not point to a higher rate, although the time is at hand when jobbers should be looking to the fall trade, which should be good in view of the excellent sentiment prevailing in practically all rural districts. Another factor that will soon aid this market is automobile demand, which is expected to start in volume about the middle of the month. Railroad purchases are spotty and light, while oil country demands are slightly improved. There is more inquiry for reinforcing mesh, which has been very backward throughout the summer months. Building is better in some areas, but the net effect on mills is insignificant.

Plates

Outstanding in this market is an announcement that a 24-in. 300-mile gas line will be laid into Detroit from Dana, Ind. An order for 30 steel barges, requiring 7500 tons, of steel, has been taken by the American Bridge Co. Railroad equipment breaks into the news with an inquiry for two tank cars, an order for two tank cars, conversion of 320 cars, the purchase of 100 gondola cars and an inquiry for two gas-electric units.

Structural Material

Both fresh inquiries, at 7800 tons, and new awards, at 8000 tons, are of sizable proportions. Nevertheless fabricators are concerned about the outlook inasmuch as Mississippi River work, which has been the main support of the market, is near the end. A lift bridge in Chicago calls for 2500 tons. Treadwell Engineering Co., Easton, Pa., is low bidder on the 2000 tons of steel on the Genoa, Wis., dam and R. C. Mahon Co., Detroit, submitted the low figure on 4000 tons for the Dubuque, Iowa, dam.

Bars

This commodity remains the most active of the heavy tonnage products. The miscellaneous trade is excellent, and more bars are moving to automobile plants and such parts makers as forgers. Agricultural implement plants are operating at 70 per cent of capacity, and tractor builders are still behind on orders to the point where one plant has again boosted its schedule.

Sheets

All current prices are being extended for fourth quarter delivery.

The matter of speculation is not foremost in consumers' minds and therefore fourth quarter contracting is dull. In fact, mills do not expect a rush to cover, believing that users will follow recent practices of buying more or less in accordance with known requirements. The movement of galvanized sheets is moderately heavier.

Scrap

Higher prices have started a liberal flow of scrap from a large area. As a consequence, dealers are paying less for needed tonnages and they are offering without success sizable tonnages to steel mills at $12.75, which is 25c. a ton less than their best price of a week ago. Railroads are still getting high prices, but industrial scrap has dropped in value to dealers, and the accumulations in dealers' yards are taking a new low position in the pricing column. Considerable trouble is being experienced with heavy melting steel that is shipped in from small Western areas where grading is not strict.

Pipe Lines

Humble Oil & Refining Co., Houston, Tex., plans new welded steel pipe line from natural gas fields to Houston and vicinity, about 40 miles, for gas supply for local industries; also a similar pipe line from gas fields at Pledger, Tex., to plant of Texas Gulf Sulphur Co., Boling, Tex., about 10 miles, where natural gas will be furnished on long-term contract. Humble company has plans for steel pipe line gathering system in a number of natural gas fields within a radius of 40 to 50 miles of city, to connect with main pipe line for supply at different points. Cost close to $500,000.

Centerville, Miss., has plans for new steel pipe line system for natural gas distribution, for which fund of about $36,000 has been arranged. S. E. Huey, Centreville, is consulting engineer.

Union Natural Gas Co., Ltd., London, Ont., has placed contract with Page-Hershey Tubes, Ltd., Montreal, for 10-in. pipe for new welded steel pipe line from natural gas fields to London and vicinity, about 60 miles, where service will be furnished in future.

Vicksburg, Miss., is considering new welded steel pipe line to natural gas fields near Jackson, Miss., for local distribution. Estimates of cost are being made, including leasing of gas properties as a municipal project. Financing will be arranged through Federal aid.

San Diego, Cal., plans about eight miles of 48-in., in connection with completion of El Capitan main water line, with remainder of line 36-in. Water will be furnished from larger section to La Mesa Lemon Grove and Spring Valley Irrigation District, which will defray $130,000 of cost. Entire project will cost $560,000. Financing is being concluded through Federal aid. Fred Pyle is city hydraulic engineer.

Texas Gas Conservation Corpn., Fort Worth, Tex., recently organized as a State project, has applied to PWA for grant and loan of $46,345,058 for welded steel pipe line from natural gas fields in Texas Panhandle district to Detroit, where gas will be furnished to Detroit Gas Co. for local distribution. Latter company will expend about $15,000,000 for connecting steel pipe lines and other field work, as well as for plant remodeling and conversion from artificial to natural gas distribution, making total cost of project over $61,000,000. Hawley, Freese & Nichols, Capps Building, Fort Worth, are consulting engineers.

United States Engineer Office, Huntington, W. Va., asks bids until Sept. 9 for wrought iron pipe and fittings (Circular 49).

Panhandle Eastern Pipe Line Co. will begin about Jan. 1 extension of natural gas line to Detroit from Dana, Ind., a distance of 300 miles; 24-in. pipe will be used.

Railroad Equipment

Chesapeake & Ohio has placed 100 automobile cars with Coleman-Sanders Mfg. Co., Richmond, Va., subsidiary of Pullman-Standard Car Mfg. Co., Chicago.

California Dispatch Line is inquiring for two tank cars.

International Petroleum Co., Ltd., has ordered two tank cars from American Car & Foundry Co. for export.

Chicago, Rock Island & Pacific has contracted with Ryan Car Co. for conversion of 320 box cars into single-deck stock cars.

Missouri & North Arkansas is inquiring for two trains, each consisting of a mail-baggage car, powered with a gas-electric engine, and a trailer coach.

Grand Trunk Western has ordered 100 hopper cars from Magor Car Corpn.

American Car & Foundry Co. has placed order with Timken Roller Bearing Co., Canton, Ohio, for Timken bearings and boxes to equip three rail cars for Seaboard Air Line Railway.

Director of Purchases, Tennessee Valley Authority, Knoxville, Tenn., asks bids until Sept. 16 for two to four standard gage 40-ton flat cars for Pickwick Landing project. New or rebuilt cars will be considered.

RAILS

New York Central closed bids Sept. 4 on 7400 tons of rails.

Cast Iron Pipe

Everett, Mass., closes bids Sept. 6 on 255 tons of 6, 8 and 10-in. class B, and about 9700 ft. of 6, 8 and 10-in. centrifugal spun pipe, one of two kinds of pipe to be purchased; also various accessories.

Lowell, Mass., closed bids Sept. 4 on 270 ft. of 6-in., 80 ft. of 8-in., 420 ft. of 12-in., 2010 ft. of 16-in. spun pipe and 100 ft. of 24-in. class B pipe.

State Board of Control, Lincoln, Neb., asks bids until Sept. 12 for water system for State hospital and reformatory, requiring about 10,600 ft. of 10 and 12-in.; also for 100,000-gal. elevated steel tank, pumping stations and auxiliary equipment. O. R. Shatto is secretary.

Middleburg, Va., has called special election Sept. 10 to vote bonds for $39,000 for pipe lines for water supply and other waterworks installation.

Norwell, Mass., plans pipe lines for water system. Fund of about $27,000 will be arranged through Federal aid for this and other waterworks installation. Whitman & Howard, 89 Broad Street, Boston, are consulting engineers.

Longview, Tex., plans water pipe lines, including replacements in present system, new water source development and other waterworks construction. Cost about $773,000, of which approximately $348,000 will be arranged through Federal aid.

Suisun, Cal., plans pipe lines for water system. Special election has been called Oct. 7 to vote bonds for $22,000 for this and other waterworks installation. Clyde C. Kennedy, Call Building, San Francisco, is engineer.

Lokesburg, Ark., plans pipe lines for water supply. Fund of $28,800 is being arranged through Federal aid for this and other waterworks installation.

Glenfield, Pa., plans 8-in. pipe for new water line across Ohio River.

Wallace, Kan., plans pipe lines for water system. Fund of $23,000 is being arranged through Federal aid for this and other waterworks installation. Charles W. Suit, Garden City, Kan., is consulting engineer.

White River, S. D., plans water pipe lines. Fund of about $37,500 will be arranged through Federal aid for this and other waterworks installation.

Alamo, Tenn., plans pipe lines for water supply. Fund of about $55,400 is being arranged through Federal aid for this and other waterworks construction. Freeland, Roberts & Co., Nashville, Tenn., are consulting engineers.

Hutsonville, Ill., will soon take bids for pipe lines for water system and other waterworks installation, including elevated steel tank and tower, and pumping equipment. Fund of $39,000 has been arranged through Federal aid. W. S. Heer Engineering Co., Bethel, Ohio, is consulting engineer.

Forsyth, Ga., has called special election Sept. 9 to vote bonds for $58,000 for pipe lines for water system and other waterworks installation.

Erie, Pa., plans about 1175 ft. of 36-in. in Sommerheim Drive for trunk water line. Cost about $25,000. A. N. Aitkin, City Hall, is city engineer.

Crawfordsville, Ark., plans pipe lines for water supply. Fund of $29,000 is being arranged for this and other waterworks installation.

Output Off At Buffalo

BUFFALO, Sept. 4.—Operations have fallen off slightly. Bethlehem's Lackawanna plant has only seven open-hearths active and may drop another furnace during the week. Republic Steel Corpn. continues to operate four furnaces and Wickwire-Spencer Steel Corpn., one. Seneca sheet division of the Bethlehem is at 60 per cent capacity.

Activity in the fabricated structural and reinforcing bar fields is limited.

The feature of the scrap market is the purchase by a Buffalo consumer of 5000 tons of No. 1 cupola cast and stove plate at $11.50 and $10.50 respectively. Some sales of short rails at $14.50, Buffalo, have been made. Another sale of about 5000 tons of No. 1 and No. 2 heavy melting steel at $12 and $11 respectively is noted. The largest consumer is feeling out the market, with a strong possibility that it will come in early this month. Scrap is scarcer. It is estimated that 15,000 to 20,000 tons have been shipped from this district to Youngstown in the past two months.

The pig iron market is characterized by a steady volume of small transactions. Furnaces have sold considerably more iron so far this quarter than was sold last year.

Prices of Finished Steel and Iron Products

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel	*Base per Lb.*
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Gary	1.85c.
F.o.b. Duluth	1.95c.
Del'd Detroit	1.95c.
F.o.b. Cleveland	1.85c.
F.o.b. Buffalo	1.90c.
Del'd Philadelphia	2.11c.
Del'd New York	2.15c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars Pacific ports	2.35c.

Rail Steel

(For merchant trade)

F.o.b. Pittsburgh	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Gary	1.75c.
F.o.b. Moline, Ill.	1.75c.
F.o.b. Cleveland	1.75c.
F.o.b. Buffalo	1.80c.
F.o.b. Birmingham	1.85c.
F.o.b. cars dock Gulf ports	2.10c.
F.o.b. cars dock Pacific ports	2.25c.

Billet Steel Reinforcing

(Straight lengths as quoted by distributers)

F.o.b. Pittsburgh	2.05c.
F.o.b. Chicago	2.10c.
F.o.b. Gary	2.10c.
Del'd Detroit	2.20c.
F.o.b. Cleveland	2.10c.
F.o.b. Youngstown	2.10c.
F.o.b. Buffalo	2.10c.
F.o.b. Birmingham	2.10c.
F.o.b. cars dock Gulf ports	2.45c.
F.o.b. cars dock Pacific ports	2.45c.

Rail Steel Reinforcing

(Straight lengths as quoted by distributers)

F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago	1.95c.
F.o.b. Gary	1.95c.
F.o.b. Cleveland	1.95c.
F.o.b. Youngstown	1.95c.
F.o.b. Buffalo	1.95c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.30c.
F.o.b. cars dock Pacific ports	2.30c.

Iron

F.o.b. Chicago	1.80c.
F.o.b. Terre Haute, Ind.	1.75c.
F.o.b. Louisville, Ky.	2.10c.
F.o.b. Danville, Pa.	1.80c.
F.o.b. Berwick, Pa.	1.70c.

Cold Finished Bars and Shafting*

	Base per Lb.
F.o.b. Pittsburgh	1.95c.
F.o.b. Chicago	2.00c.
F.o.b. Gary	2.00c.
F.o.b. Cleveland	2.00c.
F.o.b. Buffalo	2.05c.
Del'd Detroit	2.15c.
Del'd eastern Michigan	2.20c.

* In quantities of 10,000 to 19,000 lb.

Fence and Sign Posts

Angle Line Posts	*Base per Net Ton*
F.o.b. Pittsburgh	$50.00
F.o.b. Chicago	50.00
F.o.b. Duluth	51.00
F.o.b. Cleveland	50.00
F.o.b. Birmingham	53.00
F.o.b. Houston, Orange, Beaumont, Galveston	59.00
F.o.b. Mobile	58.00
F.o.b. New Orleans, Lake Charles, Corpus Christi	59.00
F.o.b. cars dock Pacific ports	63.00

Plates

	Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Gary	1.85c.
Del'd Cleveland	1.995c.
F.o.b. Coatesville	1.90c.
F.o.b. Sparrows Point	1.90c.
Del'd Philadelphia	1.99c.
Del'd New York	2.09c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.
Wrought iron plates, f.o.b. P'gh	3.20c.

Floor Plates

F.o.b. Pittsburgh	3.35c.
F.o.b. Chicago	3.40c.
F.o.b. Coatesville	3.45c.
F.o.b. cars dock Gulf ports	3.75c.
F.o.b. cars dock Pacific ports	3.90c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
Del'd Cleveland	1.995c.
F.o.b. Buffalo	1.90c.
F.o.b. Bethlehem	1.90c.
Del'd Philadelphia	2.015c.
Del'd New York	2.0625c.
F.o.b. Birmingham (standard)	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	2.15c.
F.o.b. Chicago	2.25c.
F.o.b. Buffalo	2.25c.
F.o.b. cars dock Gulf ports	2.60c.
F.o.b. cars dock Pacific ports	2.60c.

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

Hot Rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh	1.85c.
No. 10, f.o.b. Gary	1.95c.
No. 10, del'd Detroit	2.05c.
No. 10, del'd Phila.	2.16c.
No. 10, f.o.b. Birmingham	2.00c.
No. 10, f.o.b. cars dock Pacific ports	2.40c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.40c.
No. 24, f.o.b. Gary	2.50c.
No. 24, del'd Detroit	2.60c.
No. 24, del'd Phila.	2.71c.
No. 24, f.o.b. Birmingham	2.55c.
No. 24, f.o.b. cars dock Pacific ports	3.05c.
No. 24, wrought iron, Pittsburgh	4.30c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.50c.
No. 10 gage, f.o.b. Gary	2.60c.
No. 10 gage, del'd Detroit	2.70c.
No. 10 gage, del'd Phila	2.81c.
No. 10 gage, f.o.b. Birmingham	2.65c.
No. 10 gage, f.o.b. cars dock Pacific ports	3.10c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	2.95c.
No. 20 gage, f.o.b. Gary	3.05c.
No. 20 gage, del'd Detroit	3.15c.
No. 20 gage, del'd Phila.	3.26c.
No. 20 gage, f.o.b. Birmingham	3.10c.
No. 20, f.o.b. cars dock Pacific ports	3.50c.

Galvanized Sheets

No. 24 gage, f.o.b. Pittsburgh	3.10c.
No. 24, f.o.b. Gary	3.20c.
No. 24, del'd Phila.	3.41c.
No. 24, f.o.b. Birmingham	3.25c.
No. 24, f.o.b. cars dock Pacific ports	3.70c.
No. 24, wrought iron, Pittsburgh	4.95c.

Long Ternes

No. 24, unassorted 8-lb. coating f.o.b. Pittsburgh	3.40c.
F.o.b. Gary	3.50c.
F.o.b. cars dock Pacific ports	4.10c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	3.10c.
No. 20, f.o.b. Gary	3.20c.
No. 20, f.o.b. Birmingham	3.70c.
No. 20, f.o.b. cars dock Pacific ports	3.70c.
No. 10, f.o.b. Pittsburgh	2.50c.
No. 10, f.o.b. Gary	2.60c.
No. 10, f.o.b. Birmingham	3.10c.
No. 10, f.o.b. cars dock Pacific ports	3.10c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.75c.
No. 28, Gary	2.85c.
No. 28, cars dock Pacific Coast ports	3.35c.

Tin Plate

	Per Base Box
Standard cokes, f.o.b. P'gh district mill	$5.25
Standard cokes, f.o.b. Gary	5.35
Standard cokes, f.o.b. cars dock Pacific ports	5.90

Terne Plate

(F.o.b. Pittsburgh)

(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$10.00
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	14.00
30-lb. coating I.C.	15.25
40-lb. coating I.C.	17.50

Hot-Rolled Hoops, Bands, Strips and Flats under ¼ In.

	Base per Lb.
All widths up to 24 in., P'gh	1.85c.
All widths up to 24 in., Chicago	1.95c.
All widths up to 24 in., del'd Detroit	2.05c.
All widths up to 24 in., Birmingham	2.00c.
Cooperage stock, Pittsburgh	1.95c.
Cooperage stock, Chicago	2.05c.

Cold-Rolled Strips

	Base per Lb.
F.o.b. Pittsburgh	2.60c.
F.o.b. Cleveland	2.60c.
Del'd Chicago	2.895c.
F.o.b. Worcester	2.80c.

Fender Stock

No. 14, Pittsburgh or Cleveland	2.90c.
No. 14, Worcester	3.30c.
No. 20, Pittsburgh or Cleveland	3.30c.
No. 20, Worcester	3.70c.

Hot-Rolled Rail Steel Strips

	Base per Lb.
F.o.b. Pittsburgh	1.70c.
F.o.b Chicago	1.75c.
F.o.t. Birmingham	1.85c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Manufacturing Trade	*Per Lb.*
Bright wire	2.30c.
Spring wire	2.90c.

Chicago prices on products sold to the manufacturing trade are $1 a ton above Pittsburgh or Cleveland. Worcester and Duluth prices are $2 a ton above, Birmingham $3 above, and Pacific Coast prices $9 a ton above Pittsburgh or Cleveland.

To Large-Lot Buyers	*Base per Keg*
Standard wire nails	$2.40
Smooth coated nails	2.40

Base per 100 Lb.	
Annealed fence wire	$2.45
Galvanized fence wire	2.80
Polished staples	3.10
Galvanized staples	3.35
Barbed Wire, galvanized	2.80
Twisted barbless wire	2.80
Woven wire fence, base column	58.00
Single loop bale ties, base column	53.00

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is $2 above Pittsburgh); Duluth, Minn., and Worcester, Mass., mill prices are $2 a ton over Pittsburgh (except for woven wire fence at Duluth, which is $3 over Pittsburgh), and Birmingham mill prices are $3 a ton over Pittsburgh.

On wire nails, barbed wire, staples and fence wire, prices at Houston, Galveston and Corpus Christi, Tex., New Orleans, Lake Charles, La., and Mobile, Ala., are $6 a ton over Pittsburgh, while Pacific Coast prices are $8 over Pittsburgh. Exception: on fence wire Pacific Coast prices are $11 a ton above Pittsburgh.

On staples and barbed wire, prices of $6 a ton above Pittsburgh are also quoted at Beaumont and Orange, Tex.

Wire Hoops, Twisted or Welded

Off List	
F.o.b. Pittsburgh	35 and 2½ off
F.o.b. Chicago	35 off

STEEL AND WROUGHT PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel Inches	Black	Galv.	*Wrought Iron* Inches	Black	Galv.
⅛	51½	29½	⅛	+91½	+138
¼ to ⅜	53½	35	¼ & ⅜	+1½	+21½
½	58½	47	½	31½	15
¾	62	52	¾	36½	20½
1 to 3	64	55	1 & 1¼	39½	25½
			1½	42½	28
			2	41½	26

Lap Weld

2	60	51	2	37	22½
2½ to 3	63	54	2½ to 3½	38	25
3½ to 6	65	56	4 to 8	40	28½
7 and 8	64	54	9 to 12	38	24½
9 and 10	63½	53½			
11 and 12	62½	52½			

Butt Weld, extra strong, plain ends

⅛	48½	33½	⅛	+13	+45½
¼ to ⅜	51	38	¼ & ⅜	+2½	+34½
½	56½	47½	½	33½	17½
¾	61	52	¾	37½	22½
1 to 3	63	55	1 to 2	43½	29

Lap Weld, extra strong, plain ends

2	58	50	2	40	26
2½ to 3	62	54	2½ to 4	45½	33
3½ to 6	65½	57½	4½ to 6	45	33½
7 and 8	64½	54½	7 & 8	46	33
9 and 10	63½	53½	9 to 12	41½	30
11 and 12	62½	52½			

On standard steel pipe an extra 5% off is allowed on sales to consumers while two 5's off apply on sales to jobbers. On less-than-carload shipments prices are determined by adding 20 and 25% and the carload freight rate to the base card. On structural steel pipe the base card is reduced 2 points and two 5's off are allowed to consumers and three 5's off to jobbers.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Seamless Steel Commercial Boiler Tubes and Locomotive Tubes

(Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots)

			Cold Drawn	Hot Rolled
1 in. o.d.	13	B.W.G.	$ 8.60	$ 7.82
1¼ in. o.d.	13	B.W.G.	10.19	9.26
1½ in. o.d.	13	B.W.G.	11.26	10.23
1¾ in. o.d.	13	B.W.G.	12.81	11.64
2 in. o.d.	13	B.W.G.	14.35	13.04
2¼ in. o.d.	13	B.W.G.	16.00	14.54
2¼ in. o.d.	12	B.W.G.	17.61	16.01
2½ in. o.d.	12	B.W.G.	19.29	17.54
2¾ in. o.d.	12	B.W.G.	20.45	18.59
3 in. o.d.	12	B.W.G.	21.45	19.50
3½ in. o.d.	10	B.W.G.	41.08	37.35
3½ in. o.d.	11	B.W.G.	27.09	24.62
4 in. o.d.	10	B.W.G.	33.60	30.54
4½ in. o.d.	10	B.W.G.	41.08	37.35
5 in. o.d.	9	B.W.G.	51.56	46.87
6 in. o.d.	7	B.W.G.	79.15	71.96

Extras for less-carload quantities:

25,000 lb. or ft. to 39,999 lb. or ft.	5 %
12,000 lb. or ft. to 24,999 lb. or ft.	12½ %
6,000 lb. or ft. to 11,999 lb. or ft.	25 %
2,000 lb. or ft. to 5,999 lb. or ft.	35 %
Under 2,000 lb. or ft.	50 %

Lapweld Steel and Knobbled Charcoal Iron Pressure Tubes

(Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots)

			Steel	*Iron*
1½ in. o.d.	13	B.W.G.	$ 9.72	$20.16
1¾ in. o.d.	13	B.W.G.	11.06	21.84
2 in. o.d.	13	B.W.G.	12.38	17.23
2¼ in. o.d.	13	B.W.G.	13.79	19.58
2½ in. o.d.	12	B.W.G.	16.58	24.19
2¾ in. o.d.	12	B.W.G.	17.54	26.46
3 in. o.d.	12	B.W.G.	18.35	28.39
3¼ in. o.d.	11	B.W.G.	21.56	33.95
3½ in. o.d.	11	B.W.G.	23.15	36.16
4 in. o.d.	10	B.W.G.	28.66	45.36
4½ in. o.d.	10	B.W.G.	35.22	50.48
5 in. o.d.	9	B.W.G.	44.25	61.86
6 in. o.d.	7	B.W.G.	68.14	102.46

Quantity Extras:

40,000 lb. or ft.	base
25,000 lb. or ft. to 39,999 lb. or ft.	plus 5%
10,000 lb. or ft. to 24,999 lb. or ft.	plus 12½ %
2,000 lb. or ft. to 9,999 lb. or ft.	plus 25%
Under 2,000 lb. or ft.	plus 40%

CAST IRON WATER PIPE

	Per Net Ton
*6-in. and larger, del'd Chicago	$48.40
*4-in., del'd Chicago	51.40
6-in. and larger, del'd New York	45.20
4-in., del'd New York	48.20
*6-in. and larger, Birmingham	40.00
*4-in. Birmingham	43.00
6-in. and larger, f.o.b. dock, San Francisco or Los Angeles	48.00
F.o.b. dock, Seattle	48.50
4-in., f.o.b. dock, San Francisco or Los Angeles	51.00
F.o.b. dock, Seattle	51.50

Class "A" and gas pipe, $3 extra.

*Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $39, Birmingham, and $47.40, delivered Chicago, and 4-in. pipe, $42, Birmingham, and $50.40 a ton, delivered Chicago.

RAILROAD MATERIALS

Rails and Track Supplies

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton	$36.37½
Angle bars, per 100 lb.	2.55

F.o.b. Code Basing Points

Light rails (from billets) per gross ton	$35.00
Light rails (from rail steel) per gross ton	34.00

Base per 100 Lb.	
Spikes, 9/16 in. and larger	$2.40
Spikes, ½ in. and smaller	2.40
Tie plates, steel	1.90
Tie plates, Pacific Coast ports	2.00
Track bolts, to steam railroads	3.55
Track bolts, no jobbers, all sizes (per 100 count)	70 per cent off list

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Buffalo, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa.; on spikes alone, Cleveland, Youngstown, Lebanon, Pa., Columbia, Pa., Richmond, Va.

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine bolts	70, 10 and 5
Carriage bolts	70, 10 and 5
Lag bolts	70, 10 and 5
Plow bolts, Nos. 1, 2, 3 and 7 heads	70, 10 and 5
Hot-pressed nuts, blank or tapped, square	70, 10 and 5
Hot-pressed nuts, blank or tapped, hexagons	70, 10 and 5
C.p.c. and t. square or hex. nuts, blank or tapped	70, 10 and 5
Semi-finished hexagon nuts, U.S.S. and S.A.E., all sizes to and incl. 1 in. diameter	70, 10 and 5
Larger than 1 in. diameter	70
Stove bolts in packages, Pittsburgh	75
Stove bolts in packages, Chicago	75
Stove bolts in packages, Cleveland	75
Stove bolts in bulk, Pittsburgh	83
Stove bolts in bulk, Chicago	83
Stove bolts in bulk, Cleveland	83
Tire bolts	60 and 5

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$2.90
F.o.b. Chicago	3.00
F.o.b. Birmingham	3.05

Small Rivets

(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70 and 5
F.o.b. Cleveland	70 and 5
F.o.b. Chicago and Birm'g'm	70 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws, 1 in. dia. and smaller	85 and 10
Milled standard set screws, case hardened, 1 in. dia. and smaller	75 and 10
Milled headless set screws, cut thread ⅜ in. and smaller	75
Upset hex. head cap screws, U.S.S.S. or S.A.E. thread, 1 in. dia. and smaller	87½
Upset set screw, cut and oval point	80
Milled studs	65 to 65 and 10

Alloy and Stainless Steel

Alloy Steel Ingots

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem. Uncropped .....$40 per gross ton

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem. Base price, $49 a gross ton.

Alloy Steel Bars

Price del'd Detroit is $52.

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton. Open-hearth grade, base .....2.45c. Delivered price at Detroit is .....2.60c.

S.A.E. Series Numbers	Alloy Differential per 100 lb.
2000 (1% Nickel)	$0.25
2100 (2½% Nickel)	0.55
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum) (1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	base
6100 Chromium Vanadium Bar	1.20
6100 Chromium Vanadium Spring Steel	0.70
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. The differential for cold-drawn bars ½c. per lb. higher with separate extras. Blooms, billets and slabs under 4x4 in. or equivalent are sold on the bar base. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base. Sections 4x4 in. to 10x10 in. or equivalent carry a gross ton price, which is the net price for bars for the same analysis. Larger sizes carry extras.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicogo, Gary, Cleveland or Buffalo. 2.95c. base per lb.

STAINLESS STEEL No. 302

(17 to 19% Cr. 7 to 9% NI. 0.08 to 0.20% C.)

(Base Prices f.o.b. Pittsburgh)

	Per Lb.
Forging billets	19.55c.
Rerolling slabs	15c.
Bars	23c.
Plates	26c.
Structural shapes	23c.
Sheets	33c.
Hot-rolled strip	20¾c.
Cold-rolled strip	27c.
Drawn wire	23c.

Raw and Semi-Finished Steel

Carbon Steel Rerolling Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham. Uncropped .....$29 per gross ton

Carbon Steel Forging Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Birmingham. Uncropped .....$31 per gross ton

Billets, Blooms and Slabs

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham.

	Per Gross Ton
Rerolling	$27.00
Forging quality	35.00

Delivered Detroit

Rerolling	$30.00
Forging	38.00

Billets Only F.o.b. Duluth

Rerolling	$29.00
Forging	37.00

Sheet Bars

F.o.b. Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open-hearth or Bessemer	$28.00

Skelp

F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved	1.70c.
Universal	1.70c.
Sheared	1.70c.

Tube Rounds

	Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Cleveland	1.85c.
F.o.b. Buffalo	1.90c.
F.o.b. Birmingham	1.95c.

Wire Rods

(Common, base)

	Per Gross Ton
F.o.b. Pittsburgh	$38.00
F.o.b. Cleveland	38.00
Fo.b. Chicago	39.00
F.o.b. Anderson, Ind.	39.00
F.o.b. Youngstown	39.00
F.o.b. Worcester, Mass.	40.00
F.o.b. Birmingham	41.00
F.o.b. San Francisco	47.00
F.o.b. Galveston	44.00

Pig Iron and Ferroalloys

PIG IRON

PRICES PER GROSS TON AT BASING POINTS

Basing Points	No. 2 Fdry.	Malleable	Basic	Bessemer
Everett, Mass.	$19.50	$20.00	$19.00	$20.50
Bethlehem, Pa.	19.50	20.00	19.00	20.50
Birdsboro, Pa.	19.50	20.00	19.00	20.50
Swedeland, Pa.	19.50	20.00	19.00	20.50
Steelton, Pa.	....	....	19.00	....
Sparrows Point, Md.	19.50	....	19.00	....
Neville Island, Pa.	18.50	18.50	18.00	19.00
Sharpsville, Pa.	18.50	18.50	18.00	19.00
Youngstown	18.50	18.50	18.00	19.00
Buffalo	18.50	19.00	17.50	19.50
Erie, Pa.	18.50	19.00	18.00	19.50
Cleveland	18.50	18.50	18.00	19.00
Toledo, Ohio	18.50	18.50	18.00	19.00
Jackson, Ohio	20.25	20.25	19.75	20.75
Detroit	18.50	18.50	18.00	19.00
Hamilton, Ohio	18.50	18.50	18.00	19.00
Chicago	18.50	18.50	18.00	19.00
Granite City, Ill.	18.50	18.50	18.00	....
Duluth, Minn.	19.00	19.00	....	19.50
Birmingham	14.50	14.50	13.50	19.00
Provo, Utah	17.50	....	17.00	....

DELIVERED PRICES PER GROSS TON AT CONSUMING CENTERS

	No. 2 Fdry.	Malleable	Basic	Bessemer
Boston Switching District From Everett, Mass.	$20.00	$20.50	$19.50	$21.00
Brooklyn From East. Pa.	21.9289	22.4289	21.9289	22.9289
Newark or Jersey City, N. J. From East. Pa.	20.9873	21.4873	20.4873	21.9873
Philadelphia From Eastern Pa.	20.3132	20.8132	19.8132	21.3132
Cincinnati From Hamilton, Ohio	19.5807	19.5807	19.0807	20.0807
Canton, Ohio From Cleveland and Youngstown	19.8402	19.8402	19.3402	20.3402
Columbus, Ohio From Hamilton, Ohio	20.64	20.64	....	....
Mansfield, Ohio From Cleveland and Toledo	20.3832	20.3832	....	....
Indianapolis From Hamilton, Ohio	20.9289	20.9289	....	....
South Bend, Ind. From Chicago	20.6935	20.6935	....	....
Milwaukee From Chicago	19.57	19.57	....	....
St. Paul From Duluth	20.94	....	....	....
Davenport, Iowa From Chicago	20.3832	20.3832	....	....
Kansas City From Granite City	21.2178	21.2178	....	....
San Francisco, Los Angeles or Seattle. From Provo	22.315	....	....	....

Delivered prices on Southern iron for shipment to Northern points are 38c. a gross ton below delivered prices from the nearest Northern basing points.

LOW PHOSPHORUS PIG IRON

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y. $23.50

GRAY FORGE PIG IRON

Valley furnace	$18.00
Pittsburgh district furnace	18.00

CHARCOAL PIG IRON

Lake Superior furnace	$21.00
Delivered Chicago	24.2528
Delivered Buffalo	24.595

CANADA

Pig Iron

Per gross ton:

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$21.00
No. 2 fdy., sil. 1.75 to 2.75	20.50
Malleable	21.00

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$22.50
No. 2 fdy., sil. 1.75 to 2.25	22.00
Malleable	22.50
Basic	22.00

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

	Per Gross Ton
Domestic, 80% (carload)	$85.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$26.00
50-ton lots 3-mo. shipment	24.00
F.o.b. New Orleans	26.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50% (carloads)	$77.50
50% (ton lots)	85.00
75% (carloads)	126.00
75% (ton lots)	136.00

Silvery Iron

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
6%	$22.75	12%	$29.25
7%	23.75	13%	30.75
8%	24.75	14%	32.25
9%	25.75	15%	33.75
10%	26.75	16%	35.25
11%	27.75	17%	36.75

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese 2 to 3%, $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional.

Bessemer Ferrosilicon

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
10%	$27.75	14%	$33.25
11%	28.75	15%	34.75
12%	30.25	16%	36.25
13%	31.75	17%	37.75

Manganese 2 to 3%, $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional. Phosphorus 0.75% or over, $1 ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Other Ferroalloys

Ferrotungsten, per lb. contained W. del., carloads	$1.35 to $1.45
Ferrotungsten, less carloads	1.45 to 1.55
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr. per lb. contained Cr. delivered, in carloads	10.00c.
Ferrochromium, 2% carbon	16.50c. to 17.00c.
Ferrochromium, 1% carbon	17.50c. to 18.00c.
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.
Ferrovanadium, del. per lb. contained V.	$2.70 to $2.90
Ferrocarbontitanium, 15 to 18% Ti, 6 to 8% C. f.o.b. furnace carload and contract per net ton	$137.50
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton with $2 unitage	50.00
Ferrophosphorus, electric, 24%, f.o.b. Anniston, Ala., per gross ton with $2.75 unitage	65.00
Ferromolybdenum, per lb. Mo., del.	95c.
Calcium molybdate, per lb. Mo., del.	80c
Silico spiegel, per ton, f.o.b. furnace, car lots	$38.00
Ton lots or less per ton	45.50
Silico-manganese, gross ton, delivered: 2.50% carbon grade	90.00
2% carbon grade	95.00
1% carbon grade	105.00
Spot prices	$5 a ton higher

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$13.00 to $13.50
No. 2 heavy melting steel	12.00 to 12.50
No. 2 railroad wrought	13.50 to 14.00
Scrap rails	14.00 to 14.50
Rails, 3 ft. and under	15.00 to 15.50
Compressed sheet steel	13.00 to 13.50
Hand bundled sheet steel	12.00 to 12.50
Hvy. steel axle turnings	11.00 to 11.50
Machine shop turnings	9.50 to 10.00
Short shov. turnings	9.50 to 10.00
Short mixed borings and turnings	7.00 to 7.50
Cast iron borings	7.00 to 7.50
Cast iron carwheels	13.50 to 14.00
Heavy breakable cast	12.25 to 12.75
No. 1 cast	14.00 to 14.50
Railr. knuckles and couplers	15.00 to 15.50
Rail. coil and leaf springs	15.50 to 16.00
Rolled steel wheels	15.50 to 16.00
Low phos. billet crops	16.00 to 16.50
Low phos. sheet bar crops	15.50 to 16.00
Low phos. punchings	15.00 to 15.50
Low phos. plate scrap	14.50 to 15.00
Steel car axles	14.25 to 14.75

CHICAGO

Delivered Chicago district consumers:

	Per Gross Ton
Heavy melting steel	$12.25 to $12.75
Automobile hvy. melt. steel	11.25 to 11.75
Shoveling steel	12.25 to 12.75
Hydraulic comp. sheets	11.50 to 12.00
Drop forge flashings	9.50 to 10.00
No. 1 busheling	11.00 to 11.50
Rolled carwheels	12.75 to 13.25
Railroad tires	13.25 to 13.75
Railroad leaf springs	12.75 to 13.25
Axle turnings	11.00 to 11.50
Steel couplers and knuckles	13.25 to 13.75
Coil springs	14.25 to 14.75
Axle turnings (elec. fur.)	11.50 to 12.00
Low phos. punchings	14.50 to 15.00
Low phos. plates, 12 in. and under	14.50 to 15.00
Cast iron borings	6.00 to 6.50
Short shoveling turnings	6.75 to 7.25
Machine shop turnings	7.00 to 7.50
Rerolling rails	13.50 to 14.00
Steel rails, less than 3 ft.	13.50 to 14.00
Steel rails, less than 2 ft.	15.00 to 15.50
Angle bars, steel	14.00 to 14.50
Cast iron carwheels	12.75 to 13.25
Railroad malleable	14.75 to 15.25
Agricultural malleable	10.25 to 10.75

	Per Net Ton
Iron car axles	$15.50 to $16.00
Steel car axles	14.50 to 15.00
No. 1 railroad wrought	9.50 to 10.00
No. 2 railroad wrought	11.00 to 11.50
No. 2 busheling	6.50 to 7.00
Locomotive tires, smooth	11.50 to 12.00
Pipes and flues	7.00 to 7.50
No. 1 machinery cast	11.00 to 11.50
Clean automobile cast	10.50 to 11.00
No. 1 railroad cast	10.00 to 10.50
No. 1 agricultural cast	10.00 to 10.50
Stove plate	8.00 to 8.50
Grate bars	8.00 to 8.50
Brake shoes	8.00 to 8.50

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$12.00
No. 2 heavy melting steel	$11.00 to 11.25
Hydraulic compressed, new	10.00 to 10.50
Hydraulic compressed, old	8.50 to 9.00
Steel rails for rolling	14.00 to 14.50
Cast iron carwheels	11.50 to 12.00
Heavy breakable cast	11.00 to 11.50
No. 1 cast	11.50 to 12.00
Stove plate (steel works)	9.00 to 9.50
Machine shop turnings	7.00 to 7.50
No. 1 blast furnace	5.00
Heavy axle turnings	9.50 to 10.00
Cast borings	5.00 to 5.50
No. 1 low phos. heavy	14.50 to 15.00
Couplers and knuckles	14.00 to 14.50
Rolled steel wheels	14.00 to 14.50
Steel axles	16.00
Shafting	17.50
No. 1 railroad wrought	12.00 to 12.50
Spec. iron and steel pipe	9.50 to 10.00
Bundled sheets	9.50 to 10.00
No. 1 forge fire	9.50 to 10.00
Cast borings (chem.)	10.50 to 13.00

CINCINNATI

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$9.00 to $9.50
No. 2 heavy melting steel	7.50 to 8.00
Scrap rails for melting	8.75 to 9.25
Loose sheet clippings	5.50 to 6.00
Bundled sheets	6.75 to 7.25
Cast iron borings	5.00 to 5.50
Machine shop turnings	5.25 to 5.75
No. 1 busheling	6.75 to 7.25
No. 2 busheling	3.25 to 3.75
Rails for rolling	9.75 to 10.25
No. 1 locomotive tires	8.00 to 8.50
Short rails	12.50 to 13.00
Cast iron carwheels	9.00 to 9.50
No. 1 machinery cast	10.00 to 10.50
No. 1 railroad cast	9.25 to 9.75
Burnt cast	6.75 to 7.25
Stove plate	6.75 to 7.25
Agricultural malleable	8.75 to 9.25
Railroad malleable	10.00 to 10.50

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$12.00 to $12.25
No. 2 heavy melting steel	11.00 to 11.25
Compressed sheet steel	10.75 to 11.25
Light bundled sheet stampings	9.25 to 9.75
Drop forge flashings	10.50 to 11.00
Machine shop turnings	7.75 to 8.25
Short shoveling turnings	7.50 to 8.00
No. 1 busheling	10.50 to 11.00
Steel axle turnings	10.50 to 11.00
Low phos. billet crops	15.00 to 15.50
Cast iron borings	7.75 to 8.25
Mixed borings and short turnings	7.75 to 8.25
No. 2 busheling	7.75 to 8.25
No. 1 cast	12.50 to 13.00
Railroad grate bars	7.00 to 7.50
Stove plate	7.50 to 8.00
Rails under 3 ft.	13.00 to 13.50
Rails for rolling	15.50 to 16.00
Railroad malleable	14.50 to 15.00
Cast iron carwheels	10.75 to 11.00

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel	$11.50 to $12.00
No. 2 heavy melting scrap	10.50 to 11.00
Scrap rails	12.00 to 12.50
New hydraul. comp. sheets	10.50 to 11.00
Old hydraul. comp. sheets	9.50 to 10.00
Drop forge flashings	10.50 to 11.00
No. 1 busheling	10.50 to 11.00
Hvy. steel axle turnings	10.50 to 11.00
Machine shop turnings	5.50 to 6.00
Knuckles and couplers	13.00 to 14.00
Coil and leaf springs	13.00 to 14.00
Rolled steel wheels	13.00 to 14.00
Low phos. billet crops	14.50 to 15.00
Short shov. steel turnings	7.00 to 7.50
Short mixed borings and turnings	7.00 to 7.50
Cast iron borings	7.00 to 7.50
No. 2 busheling	7.00 to 7.50
Steel car axles	12.50 to 13.00
Iron axles	12.50 to 13.00
No. 1 machinery cast	12.00 to 12.50
No. 1 cupola cast	11.50 to 12.00
Stove plate	10.00 to 10.50
Steel rails, 3 ft. and under	14.00 to 14.50
Cast iron carwheels	12.00 to 12.50
Railroad malleable	13.50 to 14.00
Chemical borings	9.00 to 9.50

BOSTON

Dealers' buying prices per gross ton:

*No. 1 heavy melting steel	$9.00 to $9.50
No. 1 heavy melting steel	7.00 to 7.40
Scrap rails	7.00 to 7.50
*No. 2 steel	8.00 to 8.50
No. 2 steel	6.00 to 6.40
Breakable cast	5.50 to 5.75
Machine shop turnings	3.50 to 3.65
*Machine shop turnings	4.50 to 5.00
Bundled skeleton, long	6.00 to 6.40
Forge flashings	6.00 to 6.40
Shafting	12.00 to 12.50
Steel car axles	12.00 to 12.25
Cast iron borings, chemical	5.50 to 7.00

Per gross ton delivered consumers' yards:

Textile cast	$9.25 to $10.00
No. 1 machinery cast	9.50 to 10.00
Stove plate	6.00 to 6.50
Railroad malleable	11.00 to 11.50

* Delivered local army base.

NEW YORK

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$8.50 to $9.00
No. 2 heavy melting steel	7.50 to 8.00
Heavy breakable cast	6.75 to 7.25
No. 1 machinery cast	7.00 to 7.50
No. 2 cast	†6.50
Stove plate	†6.50
Steel car axles	13.50 to 14.00
Shafting	13.50 to 13.75
No. 1 railroad wrought	7.75 to 8.25
No. 1 yard wrought, long	6.75 to 7.25
Spec. iron and steel pipe	5.50 to 6.00
Forge fire	6.50 to 7.00
Rails for rolling	9.00 to 10.00
Short shoveling turnings	3.00 to 3.25
Machine shop turnings	3.50 to 4.00
Cast borings	3.50 to 3.75
No. 1 blast furnace	2.00 to 2.50
Cast borings (chemical)	11.00 to 11.50
Unprepared yard iron and steel	5.00 to 5.50

Per gross ton, delivered local foundries:

No. 1 machinery cast	$10.50
No. 1 hvy. cast (cupola size)	9.50
No. 2 cast	8.00

† Loading on barge.

BIRMINGHAM

Per gross ton delivered consumers' yards:

Heavy melting steel	$7.50 to $8.00
Scrap steel rails	10.00 to 10.50
Short shoveling turnings	7.00
Stove plates	7.00
Steel axles	11.50
Iron axles	11.50
No. 1 railroad wrought	7.00
Rails for rolling	12.50
No. 1 cast	10.00 to 10.50
Tramcar wheels	10.00

ST. LOUIS

Per gross ton delivered consumers' yards:

Selected heavy steel	$9.25 to $9.75
No. 1 heavy melting	8.75 to 9.25
No. 2 heavy melting	7.75 to 8.25
No. 1 locomotive tires	9.75 to 10.25
Misc. stand-sec. rails	11.00 to 11.50
Railroad springs	12.00 to 12.50
Bundled sheets	6.00 to 6.50
No. 2 railroad wrought	9.25 to 9.75
No. 1 busheling	5.00 to 5.50
Cast iron borings and shoveling turnings	3.00 to 3.50
Rails for rolling	11.50 to 12.00
Machine shop turnings	2.75 to 3.25
Heavy turnings	5.50 to 6.00
Steel car axles	12.50 to 13.00
Iron car axles	15.00 to 16.00
No. 1 railroad wrought	7.00 to 7.50
Steel rails less than 3 ft.	13.00 to 13.50
Steel angle bars	11.00 to 11.50
Cast iron carwheels	9.00 to 9.50
No. 1 machinery cast	9.00 to 9.50
Railroad malleable	10.75 to 11.25
No. 1 railroad cast	8.50 to 9.00
Stove plate	6.50 to 7.00
Agricult. malleable	8.50 to 9.00

DETROIT

Dealers' buying prices per gross ton:

Heavy melting steel	$9.50 to $10.00
Borings and short turnings	5.50 to 6.00
Long turnings	$5.25 to $5.75
No. 1 machinery cast	12.00 to 12.50
Automotive cast	12.50 to 13.00
Hydraul. comp. sheets	10.00 to 10.50
Stove plate	7.50 to 8.00
New factory busheling	8.50 to 9.00
Old No. 2 busheling	5.00 to 5.50
Sheet clippings	6.50 to 7.00
Flashings	8.00 to 8.50
Low phos. plate scrap	10.00 to 10.50

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel	$7.00	$7.00
Rails scrap	8.00	8.00
Machine shop turnings	3.00	3.00
Boiler plate	4.50	4.50
Heavy axle turnings	4.50	4.00
Cast borings	4.00	3.50
Steel borings	2.00	2.00
Wrought pipe	3.50	3.50
Steel axles	7.00	8.00
Axles, wrought iron	7.00	8.00
No. 1 machinery cast	9.00	9.00
Stove plate	5.50	5.00
Standard carwheels	7.25	7.00
Malleable	6.75	7.00

ORES, FLUORSPAR, COKE, FUEL, REFRACTORIES

Lake Superior Ores

Delivered Lower Lake Ports

	Per Gross Ton
Old range, Bessemer, 51.50% iron	$4.80
Old range, non-Bessemer, 51.50% iron	4.65
Mesabi, Bessemer, 51.50% iron	4.65
Mesabi, non-Bessemer, 51.50% iron	.50
High phosphorus, 51.50% iron	4.40

Foreign Ore

C.i.f. Philadelphia or Baltimore

	Per Unit
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algeria	10.50c.
Iron, low phos., Swedish, average 68½% iron	10.50c.
Iron, basic or foundry, Swedish, aver. 65% iron	9.50c.
Iron, basic or foundry, Russian, aver. 65% iron	9.50c.
Manganese, Caucasian, washed 52%	26c.
Manganese, African, Indian, 44-48%	22c.
Manganese, African, Indian, 49-51%	24c.
Manganese, Brazilian, 46 to 48½%	20c.

	Per Net Ton Unit
Tungsten, Chinese, wolframite, duty paid, delivered	$15.50 to $16.00
Tungsten, domestic, scheelite, delivered	15.00

	Per Gross Ton
Chrome, 45% Cr_2O_3, lump, c.i.f. Atlantic Seaboard (African)	$17.50
45 to 46% Cr_2O_3 (Turkish)	$16.00 to 16.50
48% Cr_2O_3 (African)	20.50
48% min. Cr_2O_3 (Turkish)	19.25
Chrome concentrate, 50% and over Cr_2O_3, c.i.f. Atlantic Seaboard	22.00
52% Cr_2O_3 (Turkish)	21.75
48 to 49% Cr_2O_3 (Turkish)	19.25

Fluorspar

	Per Net Ton
Domestic, washed gravel, 85-5, f.o.b. Kentucky and Illinois mines for all-rail shipment	$14.00 to $15.00
Same grade for Ohio River barge shipment for Kentucky and Illinois River landings	14.00 to 15.00
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	14.00 to 15.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	18.50
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	30.00

COKE, COAL AND FUEL OIL

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville Prompt	$3.25 to $3.50
Foundry, f.o.b. Connellsville Prompt	4.00 to 5.10
Foundry, by-product, Chicago ovens, for delivery outside switching district	8.50
Foundry, by-product, delivered in Chicago switching district	9.25
Foundry, by-product, New England, delivered	11.00
Foundry, by-product, Newark or Jersey City, del'd	9.24 to 9.72
Foundry, by-product, Phila.	9.03
Foundry, by-product, Cleveland, delivered	9.25
Foundry, Birmingham	6.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00
Foundry, from Birmingham, f.o.b. cars docks, Pacific ports	14.75

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.45 to $1.65
Mine run coking coal, f.o.b. W. Pa.	1.75 to 1.95
Gas coal, ¾-in., f.o.b. Pa. mines	1.85 to 2.35
Mine run gas coal, f.o.b. Pa. mines	1.75 to 1.95
Steam slack, f.o.b. W. Pa. mines	1.00 to 1.25
Gas slack, f.o.b. W. Pa. mines	1.20 to 1.45

Fuel Oil

	Per Gal. f.o.b. Bayonne, N. J.
No. 3 distillate	4.25c.
No. 4 industrial	3.87½c.

	Per Gal. f.o.b. Baltimore
No. 3 distillate	4.25c.
No. 4 industrial	3.87½c.

	Per Gal. del'd Chicago
No. 3 industrial fuel oil	4.75c.
No. 5 industrial fuel oil	3.75c.

	Per Gal. f.o.b. Cleveland
No. 3 distillate	5.25c.
No. 4 industrial	5.12½c.
No. 5 industrial	4.25c.

REFRACTORIES

Fire Clay Brick

	Per 1000 f.o.b. Works High-heat Duty Brick	Intermediate Duty Brick
Pennsylvania	$45.00	$40.00
Maryland	5.00	40.00
New Jersey	50.00	43.00
Ohio	45.00	40.00
Kentucky	45.00	40.00
Missouri	45.00	40.00
Illinois	45.00	40.00
Ground fire clay, per ton	7.00	

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$45.00
Chicago District	54.00
Birmingham	55.00
Silica clay, per net ton	8.00

Chrome Brick

	Per Net Ton
Standard, f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	$45.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	45.00

Magnesite Brick

	Per Net Ton
Standard, f.o.b. Baltimore and Chester, Pa.	$45.00
Chemically Bonded, f.o.b. Baltimore	55.00

Grain Magnesite

	Per Net Ton
Imported f.o.b. Baltimore and Chester, Pa.	$45.00
Domestic, f.o.b. Baltimore and Chester	40.00
Domestic, f.o.b. Chewelah, Wash.	22.00

Warehouse Prices for Steel Products

PITTSBURGH

Base per Lb.

Plates	3.15c.
Structural shapes	3.15c.
Soft steel bars and small shapes	2.90c.
Reinforcing steel bars	2.90c.
Cold-finished and screw stock:	
Rounds and hexagons	3.20c.
Squares and flats	3.20c.
Hoops and bands under ¼ in.	3.20c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.30c.
Galv. sheets (No. 24), 25 or more bundles	3.95c.
Hot-rolled sheets (No. 10)	2.95c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	$3.69
Spikes, large	2.90c.
Track bolts, all sizes, per 100 count, 65 per cent off list.	
Machine bolts, 100 count, 65 per cent off list.	
Carriage bolts, 100 count, 65 per cent off list.	
Nuts, all styles, 100 count, 65 per cent off list.	
Large rivets, base per 100 lb.	$3.50
Wire, black, soft ann'l'd, base per 100 lb.	*2.70
Wire, galv. soft, base per 100 lb.	*2.925
Common wire nails, per keg	*2.834
Coment coated nails, per keg	*2.834

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 9999 lbs.

*Delivered in Pittsburgh switching district.

CHICAGO

Base per Lb.

Plates and structural shapes	3.20c.
Soft steel bars	2.95c.
Cold-fin. steel bars:	
Rounds and hexagons	3.35c.
Flats and squares	3.35c.
Hot-rolled strip	3.30c.
Hot-rolled annealed sheets (No. 24)	3.85c.
Galv. sheets (No. 24)	4.55c.
Hot rolled sheets (No. 10)	3.05c.
Spikes (keg lots)	3.50c.
Track bolts (keg lots)	4.65c.
Rivets, structural (keg lots)	3.65c.
Rivets, boiler (keg lots)	3.75c.
	Per Cent Off List
Machine bolts	*70
Carriage bolts	*70
Lag screws	*70
Hot-pressed nuts, sq. tap. or	
Hot-pressed nuts, sq. tap or blank	*70
Hot-pressed nuts, hxe. tap or	
Hot-pressed nuts, hex. tap or blank	*70
Hex. head cap screws	87½
Cut point set screws	80
Flat head bright wood screws	50 and 20
Spring cotters	55
Stove bolts in full packages	70
Rd. hd. tank rivets, 7/16 in. and smaller	57½
Wrought washers	$4.50 off list
Black ann'l'd wire per 100 lb.	$3.85
Com. wire nails, base per keg	2.85†
Cement c't'd nails, base per keg	2.95†

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 9999 lb. All prices are f.o.b. consumers' plants within the Chicago switching district.

*These are quotations delivered to city trade for quantities of 100 lb. or more. For lots of less than 100 lb., the quotation is 65 per cent off. Discounts applying to country trade are 70 per cent off, f.o.b., Chicago, with full or partial freight allowed up to 50c. per 100 lb.

†Prices for city and suburbs only.

NEW YORK

Base per Lb.

Plates, ¼ in. and heavier	3.40c.
Structural shapes	3.37c.
Soft steel bars, small shapes	3.26c.
Iron bars	3.26c.
Iron bars, swed. charcoal	6.75c. to 7.00c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	3.81c.
Flats and squares	4.31c.
Cold-rolled; strip, soft and quarter hard	3.36c.
Hoops	3.56c.
Bands	3.56c.
Hot-rolled sheet (No. 10)	3.31c.
Hot-rolled ann'l'd sheets (No. 24*)	3.89c.
Galvanized sheets (No. 24*)	4.50c.
Long terne sheets (No. 24)	5.20c.
Standard tool steel	11.00c.
Wire, black annealed (No. 10)	3.40c.
Wire, galv. (No. 10)	3.75c.
Tire steel, 1 x ½ in. and larger	3.65c.
Open hearth spring steel	4.00c. to 10.00c.
Common wire nails, base, per keg	$3.21
	Per Cent Off List
Machine bolts, cut thread: All diameters	65 and 10
Carriage bolts, cut thread: All diameters	65 and 10
Boiler tubes:	Per 100 Ft.
Lap welded, 2-in.	$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron 4-in.	63.65

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

Base per Lb.

Plates and struc. shapes	3.45c.
Bars, soft steel or iron	3.20c.
Cold-fin. rounds, shafting, screw stocks	3.60c.
Hot-rolled annealed sheets (No. 24)	4.10c.
Galv. sheets (No. 24)	4.65c.
Hot-rolled sheets (No. 10)	3.30c.
Black corrug. sheets (No. 24)	4.10c.
*Galv. corrug. sheets	4.65c.
Structural rivets	4.00c.
Boiler rivets	4.10c.
	Per Cent Off List
Tank rivets, 7/16 in. and smaller	55
Machine and carriage bolts, lag screws, fitting up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts: All quantities	70

*No. 26 and lighter take special prices.

PHILADELPHIA

Base per Lb.

*Plates, ¼-in. and heavier	2.98c.
*Structural shapes	2.98c.
*Soft steel bars, small shapes, iron bars (except bands)	2.93c.
‡Reinforec. steel bars, sq. twisted and deformed	2.96c.
Cold-finished steel bars	3.61c.
*Steel hoops	3.43c.
*Steel bands, No. 12 and 3/16 in. incl.	3.18c.
Spring steel	5.00c.
†Hot-rolled anneal. sheets (No. 24)	3.65c.
†Galvanized sheets (No. 24)	4.30c.
*Hot-rolled annealed sheets (No. 10)	3.08c.
Diam. pat. floor plates, ¼ in.	4.95c.
Swedish iron bars	6.25c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

*Base prices subject to deduction on orders aggregating 4000 lb. or over.

†For 50 bundles or over.

‡For less than 2000 lb.

CLEVELAND

Base per Lb.

Plates and struc. shapes	3.31c.
Soft steel bars	2.95c.
Reinforc. steel bars	2.10c.
Cold-finished steel bars	3.25c.
Flat-rolled steel under ¼ in.	3.36c.
Cold-finished strip	$3.00c.
Hot-rolled annealed sheets (No. 24)	3.96c.
Galvanized sheets (No. 24)	4.61c.
Hot-rolled sheets (No. 10)	3.11c.
Hot-rolled 3/16 in. 24 to 48 in. wide sheets	3.56c.
Black ann'l'd wire, per 100 lb.	$2.65
No. 9 galv. wire, per 100 lb.	3.00
Com. wire nails, base per keg	2.40

†Outside delivery 10c. less.

CINCINNATI

Base per Lb.

Plates and struc. shapes	3.42c.
Bars, soft steel or iron	3.17c.
New billet reinforc. bars	3.25c.
Rail steel reinforc. bars	3.25c.
Hoops and bands, 3/16 in. and lighter	3.47c.
Cold-finished bars	3.57c.
Hot-rolled annealed sheets (No. 24)	4.02c.
Galv. sheets (No. 24)	4.72c.
Hot-rolled sheets (No. 10)	3.22c.
Structural rivets	4.35c.
Small rivets	55 per cent off list
No. 9 ann'l'd wire, per 100 lb. (1000 lb. or over)	$2.88
Com. wire nails, base per keg:	
Any quantity less than carload	3.04
Cement c't'd nails, base 100-lb. keg	3.50
Chain, 1-in. per 100 lb.	8.35
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$22.66
4-in.	48.14
Lap-welded steel boiler tubes, 2-in.	19.35
4-in.	45.30

BUFFALO

Base per Lb.

Plates	3.38c.
Struc. shapes	3.25c.
Soft. steel bars	3.00c.
Reinforcing bars	2.60c.
Cold-fin. flats and sq.	3.40c.
Round and hex.	3.40c.
Cold-rolled strip steel	3.10c.
Hot-rolled annealed sheets (No. 24)	4.06c.
Heavy hot-rolled sheets, 3/16 in., 24 to 48 in. wide	3.63c.
Galv. sheets (No. 24)	4.70c.
Bands	3.43c.
Hoops	3.43c.
Heavy hot-rolled sheets	3.18c.
Com. wire nails, base per keg	$3.35
Black wire, base per 100 lb. (2500-lb. lots or under)	3.55
(Over 2500 lb.)	3.45

BOSTON

Base per Lb.

Beams, channels, angles, tees, zees	3.54c.
H beams and shapes	3.51c.
Plates—sheered, tank and univ. mill, ¼ in. thick and heavier	3.56c.
Floor plates, diamond pattern	5.36c.
Bar and bar shapes (mild steel)	3.35c.
Bands 3/16 in. thick and No. 12 ga. incl.	3.65c. to 4.65c.
Half rounds, half ovals, ovals and bevels	4.60c.
Tire steel	4.60c.
Cold-rolled strip steel	3.245c.
Cold-finished rounds, squares and hexagons	3.90c.
Cold-finished flats	3.75c.
Blue annealed sheets, No. 10 ga.	3.65c.
One pass cold-rolled sheets No. 24 ga.	4.20c.
Galvanized steel sheets, No. 24 ga.	4.90c.
Lead coated sheets, No. 24 ga.	5.85c.

Prices delivered by truck in metropolitan Boston, subject to quantity differentials.

DETROIT

Base per Lb.

Soft and bars	3.04c.
Structural shapes	3.42c.
Plates	3.42c.
Floor plates	5.17c.
Hot-rolled annealed sheets (No. 24)	3.94c.
Hot-rolled sheets (No. 10)	3.14c.
Galvanized sheets (No. 24)	4.72c.
Bands	3.39c.
Hoops	3.39c.
Cold-finished bars	3.49c.
Cold-rolled strip	3.18c.
Hot-rolled alloy steel (S.A.E. 3100 Series)	5.29c.*
Bolts and nuts	70 and 5 per cent off list

Prices delivered by truck in metropolitan Detroit, subject to quantity differentials.

*Price applies to 1,000 lb. and over.

MILWAUKEE

Base per Lb.

Plates and structural shapes	3.31c.
Soft steel bars	3.06c.
Hot-rolled strip	3.41c.
Hot-rolled sheets (No. 10)	3.16c.
Hot-rolled annealed sheets (No. 24)	3.96c.
Galvanized sheets (No. 24)	4.66c.
Cold-finished steel bars	3.46c.
Cold-rolled strip	3.33c.
Structural rivets (keg lots)	3.86c.
Boiler rivets (keg lots)	3.96c.
Track spikes (keg lots)	3.71c.
Track bolts (keg lots)	4.86c.
Black annealed wire	3.10c.
Com. wire nails	2.90c.
Cement coated nails	2.90c.
	Per Cent Off List
Machine bolts	70 and 10
Carriage bolts	70 and 10
Hot-pressed nuts, sq. and hex. tapped or blank (keg lots)	70 and 10

Prices given above are delivered Milwaukee.

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 9999 lb. On galvanized and No. 24 hot-rolled annealed sheets the prices given apply on orders of 400 to 1500 lb. On cold-finished bars the prices are for orders of 1000 lb. or more of a size.

ST. PAUL

Base per Lb.

Mild steel bars	3.20c.
Structural shapes	3.45c.
Plates	3.45c.
Cold-finished bars	3.87c.
Bands and hoops	3.55c.
Hot-rolled annealed sheets, No. 24	3.90c.
Galvanized sheets, No. 24	4.50c.
Cold-rolled sheets, No. 20	4.95c.

On mild steel bars, shapes, plates and hoops and bands the base applies on 400 to 14,999 lb. On cold-finished bars, hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over.

BALTIMORE

Base per Lb.

*Mild steel bars	2.95c.
*Iron bars	2.95c.
*Reinforcing bars	2.95c.
*Structural shapes	3.00c.
†Plates	3.00c.
†Hot-rolled sheet, No. 10	3.10c.
‡Hot-rolled annealed sheets, No. 24	3.60c.
‡Galvanized sheets, No. 24	4.30c.
*Bands	3.20c.
*Hoops	3.45c.
§Cold-rolled rounds	3.58c.
§Cold-rolled squares, hex. and flats	3.58c.
Rivets	4.40c.
Bolts and nuts, per cent off list	60 and 10

*Quantity extras per size apply. †Quantity extras per thickness apply. Hot-rolled quantity extras are: 2000 lb. and over, base: 1500 lb. to 1999 lb., add 15c. per 100 lb.; 1000 lb. to 1499 lb., add 30c.; 0 to 999 lb., add 50c.

‡50 bundles and over, base. For 1 to 9 bundles add 50c. per 100 lb.; for 10 to 49 bundles add 25c.

§Base for 1000 lb. and over. For 500 to 999 lb. add 25c. per 100 lb.; for 300 to 499 lb. add 75c.; for 0 to 299 lb. add $1.25.

CHATTANOOGA

Base per Lb.

Mild steel bars	3.31c.
Iron bars	3.31c.
Reinforcing bars	3.31c.
Structural shapes	3.56c.
Plates	3.56c.
Hot-rolled sheets, No. 10	3.36c.
Hot-rolled annealed sheets, No. 24	4.31c.
Galvanized sheets, No. 24	4.84c.
Steel bands	3.61c.
Cold-finished bars	3.98c.

MEMPHIS

Base per Lb.

Mild steel bars	3.42c.
Shapes, bar size	3.42c.
Iron bars	3.42c.
Structural shapes	3.67c.
Plates	3.67c.
Hot-rolled sheets, No. 10	3.47c.
Hot-rolled annealed sheets, No. 24	4.27c.
Galvanized sheets, No. 24	4.97c.
Steel bands	3.72c.
Cold-drawn rounds	3.89c.
Cold-drawn flats, squares, hexagons	5.89c.
Structural rivets	4.25c.
Bolts and nuts, per cent off list	65
Small rivets, per cent off list	50

NEW ORLEANS

Base per Lb.

Mild steel bars	3.30c.
Reinforcing bars	3.50c.
Structural shapes	3.55c.
Plates	3.55c.
Hot-rolled sheets, No. 10	3.55c.
Hot-rolled annealed sheets, No. 24	4.50c.
Galvanized sheets, No. 24	4.95c.
Steel bands	3.95c.
Cold-finished steel bars	4.15c.
Structural rivets	4.25c.
Boiler rivets	4.25c.
Common wire nails, base per keg	$3.10
Bolts and nuts, per cent off list	70

PACIFIC COAST

Base per Lb.

	San Francisco	Los Angeles	Seattle
Plates, tank and U. M.	3.55c.	3.60c.	3.55c.
Shapes, standard	3.55c.	3.60c.	3.55c.
Soft steel bars	3.60c.	3.60c.	3.60c.
Reinforcing bars, f.o.b cars dock Pacific ports	2.45c.	2.45c.	2.45c.
Hot-rolled annealed sheets (No. 24)	4.40c.	4.35c.	4.40c.
Hot-rolled sheets (No. 10)	3.75c.	3.70c.	3.75c.
Galv. sheets (No. 24)	5.00c.	4.95c.	5.00c.
Cold finished steel: Rounds	5.95c.	5.85c.	6.00c.
Squares and hexagons	7.20c.	7.10c.	7.25c.
Flats	7.70c.	7.60c.	8.25c.
Common wire nails —base per keg less carload	$3.30	$3.40	$3.30

All items subject to differentials for quantity.

TOOL STEEL

Prices are same for warehouse distribution at all points on or East of Mississippi River. West of Mississippi quotations are 1c. a lb. higher.

Base per Lb.

High speed	57c.
High carbon chrome	37c.
Oil hardening	22c.
Extra	17c.
Regular	14c.

August Copper Sales Total Nearly 125,000 Tons—Early September Buying Light

Lead Users Show More Interest in Future Positions—Spelter Very Dull—Tin Prices Easier as Demand Drops Off

NEW YORK, Sept. 4.—Although copper sales during August reached the amazing total of 124,603 tons, bringing transactions for the last two months over the 200,000-ton level, business thus far in September has been very quiet. Sales yesterday amounted to less than 50 tons and consumers are showing no interest whatever in the market. Talk of higher prices has entirely subsided for the time being and sellers are apparently content to maintain the market at the current level of 8.50c., Connecticut Valley. The foreign market is also rather dull, with prices today ranging from 8.15c. to 8.20c. a lb., usual Continental base ports.

Tin

The holiday had the usual depressing influence on the tin market and sales during the last week have been negligible. Declining tin plate operations are also an important factor in the current market lethargy, and, with little prospect of improvement in the near future, tin prices have eased off steadily in the last few days. The market on Straits metal here today was quotable at 48.62½c. a lb., compared with 49.25c. a week ago. At London, standard tin was offered at £219 10s. for spot and £209 for futures, while the quotation in the East was £217 7s. 6d. United States tin deliveries during August amounted to 5320 tons and apparently exceeded consumption slightly for the first time this year. Deliveries last month totaled 5290 tons, while in the year to date the corresponding figure was 39,000 tons. The world's visible supply of tin declined 645 tons during August to a total of 14,218 tons.

Lead

This market is relatively quite despite the comparatively favorable statistical position. August shipments are believed to have totaled 38,000 to 40,000 tons and exceeded production by a comfortable margin. Prices are very firm at 4.20c. a lb., St. Louis, and 4.35c., New York, while the leading interest continues to maintain a $1 a ton premium on sales in the East. Some sellers have already booked 75 per cent of their September lead and report considerable interest in October metal. Lead concentrates were advanced on Saturday to $45 a ton, compared with a range of $43 to $45 previously.

Zinc

Sales last week were light, having amounted to less than 2800 tons, as compared with 4450 tons in the preceding period. This was in line with expectations in the trade, as purchases during the middle and latter part of August were quite heavy. Prices are well sustained at 4.60c., East St. Louis, and 4.97½c., New York. The ore market is also dull, with quotations unchanged at $29 and $30 a ton. Production of 8600 tons exceeded shipments, which totaled only 7350 tons.

Non-Ferrous Averages

The average prices of the major non-ferrous metals for August, based on daily quotations in THE IRON AGE, are as follows:

	Average
Electrolytic copper, N. Y.‡.	7.972c. a lb.
Lake copper, Eastern delivery	8.347c. a lb.
Straits tin, spot, N. Y.	50.458c. a lb.
Zinc, East St. Louis	4.544c. a lb.
Zinc, New York	4.919c. a lb.
Lead, St. Louis	4.104c. a lb.
Lead, New York	4.254c. a lb.

‡Price ¼c. higher in Connecticut Valley.

E. J. Lavino & Co., Philadelphia, and its affiliated organizations, Lavino Refractories Co., Lavino Furnace Co., Lavino Shipping Co. and Rogers Brown-Lavino Co., have removed their general offices to 1528 Walnut Street, Philadelphia.

The Week's Prices. Cents Per Pound for Early Delivery

	Aug. 28	Aug. 29	Aug. 30	Aug. 31	Sept. 3	Sept. 4
Electrolytic copper, N. Y.*	8.25	8.25	8.25	8.25	8.25	8.25
Lake copper, N. Y.	8.62½	8.62½	8.62½	8.62½	8.62½	8.62½
Straits tin, spot, New York	49.25	49.25	49.12½	....	48.87½	48.62½
Zinc, East St. Louis	4.60	4.60	4.60	4.60	4.60	4.60
Zinc, New York†	4.97½	4.97½	4.97½	4.97½	4.97½	4.97½
Lead, St. Louis	4.20	4.20	4.20	4.20	4.20	4.20
Lead, New York	4.35	4.35	4.35	4.35	4.35	4.35

*Refinery quotations; price ¼c. higher delivered in Connecticut.
†Includes emergency freight charge.

Aluminum, virgin 99 per cent plus, 19c. to 21c. a lb., delivered.
Aluminum, No. 12 remelt, No. 2 standard, in carloads, 16.25c. a lb., delivered.
Nickel, electrolytic, 35c. to 36c. a lb. base refinery, in lots of 2 tons or more.
Antimony, Asiatic, 13c. a lb., New York.
Quicksilver, $69 to $71 per flask.
Brass ingots, commercial 85-5-5-5, 8.50c. a lb., delivered; in Middle West ¼c. a lb. is added on orders for less than 40,000 lb.

From New York Warehouse
Delivered Prices, Base per Lb.

Tin, Straits pig	50.00c. to 51.00c.
Tin, bar	52.00c. to 53.00c.
Copper, Lake	9.50c. to 10.50c.
Copper, electrolytic	9.50c. to 10.50c.
Copper, castings	9.25c. to 10.25c.
*Copper sheets, hot-rolled	15.50c.
*High brass sheets	14.00c.
*Seamless brass tubes	15.75c.
*Seamless copper tubes	15.75c.
*Brass rods	12.50c.
Zinc, slabs	5.75c. to 6.75c.
Zinc, sheets (No. 9), casks, 1200 lb. and over	10.25c.
Lead, American pig	4.85c. to 5.85c.
Lead, bar	5.85c. to 6.85c.
Lead, sheets	8.00c.
Antimony, Asiatic	13.50c. to 14.50c.
Alum., virgin, 99 per cent, plus	23.30c.
Alum., No. 1 for remelting, 98 to 99 per cent	18.00c. to 19.00c.
Solder, ½ and ½	30.00c. to 31.00
Babbitt metal, commercial grades	25.00c. to 60.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse
Delivered Prices per Lb.

Tin, Straits pig	53.50c.
Tin, bar	55.50c.
Copper, Lake	9.50c.
Copper, electrolytic	9.50c.
Copper, castings	9.25c.
Zinc, slabs	6.00c. to 6.25c.
Lead, American pig	4.95c. to 5.30c.
Lead, bar	8.25c.
Antimony, Asiatic	15.00c.
Babbitt metal, medium grade	19.25c.
Babbitt metal, high-grade	57.50c.
Solder, ½ and ½	31.50c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	6.00c.	6.75c.
Copper, hvy. and wire	5.87½c.	6.37½c.
Copper, light and bottoms	4.87½c.	5.37½c.
Brass, heavy	3.25c.	3.87½c.
Brass, light	2.50c.	3.25c.
Hvy. machine composition	5.37½c.	5.87½c.
No. 1 yel. brass turnings	4.50c.	5.00c.
No. 1 red brass or compos. turnings	4.87½c.	5.37½c.
Lead, heavy	3.25c.	3.62½c.
Zinc	2.37½c.	2.75c.
Cast aluminum	11.62½c.	12.75c.
Sheet aluminum	12.75c.	14.25c.

Cleveland Operations Rise Two Points

Present Rate Is 45 Per Cent—Automotive Releases Increase—Bar Card Change Stimulates Buying

CLEVELAND, Sept. 4.—Present prices have been reestablished for the fourth quarter on sheets, hot and cold-rolled strip, plates and shapes, alloy steel bars and rivets. Merchant bars have been given a $1 a ton higher base, with quantity differentials. The only other change reported is the elimination of the $2 a ton discount on galvanized sheets to jobbers and roofing manufacturers. Consumers having contracts will be given the benefit of the new price schedules on bars for September shipment providing they place lots of 50 tons or over on which the deduction for quantity brings the price below the price that has been prevailing.

Ingot output in the Cleveland-Lorain territory gained two points this week after remaining stationary for two weeks. Increased automotive business enabled a local plant producing sheets and strip steel to put on an additional open-hearth furnace.

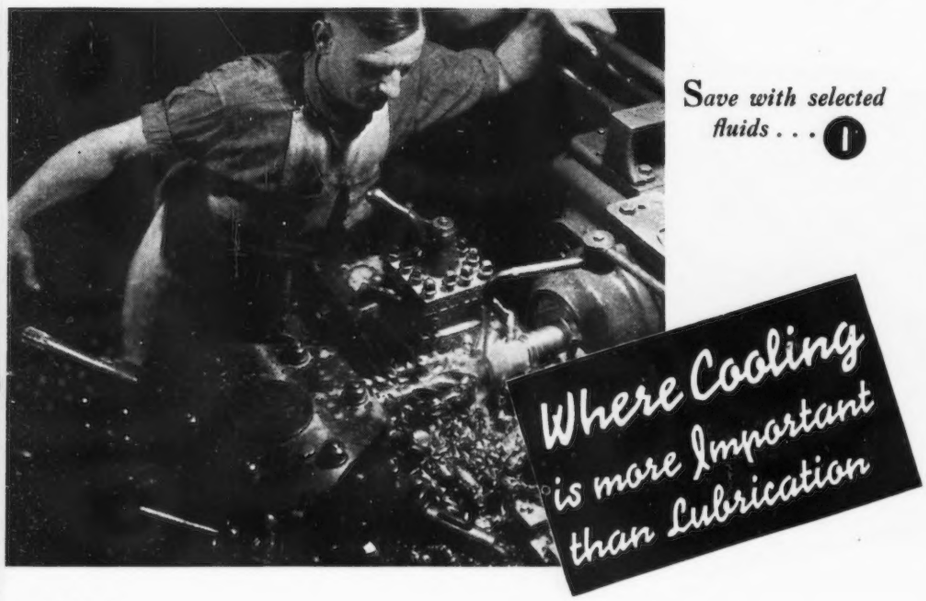
Demand for finished steel has shown a moderate upturn. Several large consuming plants in the automotive field have issued releases for sheets and strip, shipments of which were held up during the vacation shutdowns that terminated last week, and, as the time that automobile manufacturers will get under production on new models draws near, new demand from that source has picked up, although orders are for small tonnages. Sheet and strip orders for delivery through October have been placed by some automotive plants. Forging plants making automobile parts have increased their specifications.

Miscellaneous demand for steel is slightly better. The only activity in the railroad field is the placing of 200 tons of sheet steel piling by the Wheeling & Lake Erie Railroad.

Considerable inquiry for pig iron has followed the reestablishment of fourth quarter prices, evidently stimulated by the possibility of an advance before the end of the quarter. The Globe furnace at Jackson, Ohio, was blown in Sept. 3.

Bars, Plates and Shapes

A Cleveland producer has joined with other mills in advancing the base for hot-rolled bars $1 a ton to 1.90c., Cleveland. Bolt and nut and rivet manufacturers and most forge shops will secure their steel at 1.80c., Cleveland, or $1 a ton below the price that has been prevailing, as they usually buy in lots of 100 tons or more. Smaller consumers are expected to buy larger lots than heretofore to secure a better price. The immediate effect of the new price set-up is an increase in size of bar orders by some of the smaller consumers now having contracts. The new bar differentials will apply to angles and channels in bar sizes. Activity in the construction field has declined. Considerable tonnage in shapes and reinforcing bars will be required for local grade crossing elimina-



Save with selected fluids . . . 1

WHEN the work demands mostly a *coolant,* rather than lubricant, danger creeps in—the danger of rusting the parts in process. Yet, it's only good sense, for economy's sake, to keep water proportions safely high.

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SUPERLA SOLUBLE OIL *is easily mixed with water, stable in storage, and permits wide variations of concentration.*

ACME BASE OILS (*2 grades*)

STANOSTAMP

STANDARD CUTTING COMPOUND (*a soluble paste*)

AND . . . *cutting fluids compounded with animal and vegetable oils, forge die lubricants, etc.*

tion projects provided PWA funds can be secured.

Pig Iron

With the opening of books by Lake furnaces Sept. 3 for the fourth quarter at the current prices of $18.50 for foundry and malleable iron and $18 for basic, considerable inquiry has come out for lots up to 500 tons. Sellers expect to have a very active market for the next week or two, as many consumers desire to get under cover because of the possibility that prices will be marked up during the quarter. Sales during the last week of August were light, as furnaces took orders for only September delivery. Shipments during August were 30 to 35 per cent heavier than in July. New releases have come from automotive foundries which have taken little iron for some time.

Sheets

Present prices have been reestablished for the fourth quarter and some business has been taken for October shipment. The only change in the price set-up is the elimination of the $2 a ton discount on galvanized sheets to jobbers and roofing manufacturers. This becomes effective Oct. 1 and buyers having the preferential price are expected to stock up rather heavily this month. New demand from the automotive industry has improved, as motor car manufacturers have definitely established the sizes they will require for new models. Considerable tonnage was released this week by the local Fisher Body and other plants in the automotive field that had held up shipments because of vacation shut-downs.

Strip Steel

Present prices on both hot and cold-rolled strip are being quoted for the fourth quarter, for which producers opened their books this week. While new business is not lively, releases against orders previously entered have improved. Some of the automotive parts plants have contracted for good tonnages covering their requirements through October.

Iron Ore

Water shipments of Lake Superior ore during August were 4,780,570 tons, a slight gain over July when the movement was 4,460,536 tons. August shipments were 618,884 tons larger than during the same month last year. Total shipments until Sept. 1 were 17,386,559 tons. This is a gain of 1,701,348 tons, or 10.85 per cent over the same period last year.

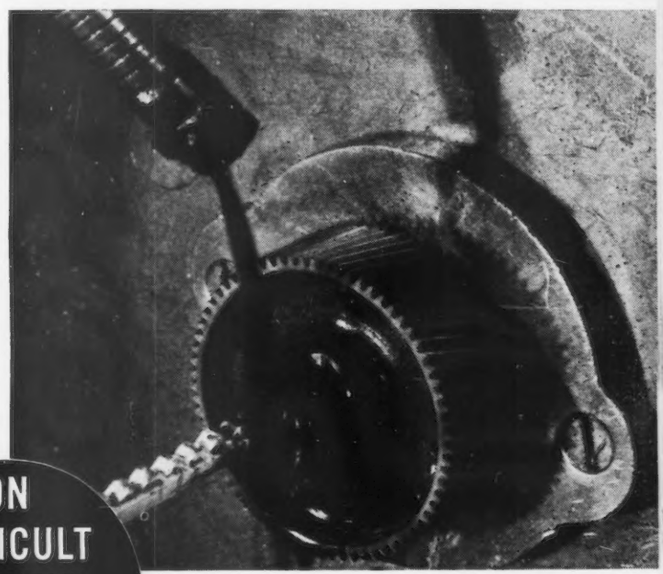
Bolts, Nuts and Rivets

Present rivet prices of $2.90 per 100 lb. for large and 70 and 5 per cent discount for small rivets have been reestablished for the fourth quarter. Bolt and nut prices have not been named for that delivery. Makers feel that with increased demand they may be able to eliminate present price irregularities. Shipments in August were lighter than in July but commitments were heavier, due to large orders placed by motor car manufacturers against which releases have not yet been issued.

Scrap

A Cleveland consumer during the week purchased a small tonnage of No. 1 heavy melting steel at $12.50 and the market on both steel-making and blast furnace grades is about 25c. a ton higher. Dealers are offering $7.75 for blast furnace scrap for Cleveland delivery, although that price is not bringing out much scrap. For shipment to the Valley district dealers are paying $13.25 for No. 1 heavy melting steel.

Save with selected fluids . . . 2



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The personal help of men from your local Standard Oil (Indiana) office might definitely enable you to increase speeds, feeds, or depth of cuts, without jeopardizing quality—or it might enable you to make direct savings by a slight change in practice. Such help is constantly doing these things for others.

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☐ "Lubricating in Gear Cutting Operations"
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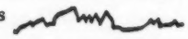
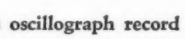
THE ARC THAT SHOWS UP IN THE SHOW DOWN

You'll find out more about arc welder performance from the oscillograph record than you can learn otherwise in a month of Sundays.

When it looks like this:  you have the varying heat intensity that means lack of uniform strength in welds.

P&H-Hansen's oscillograph record looks like this:  That's why you weld faster, more effectively with P&H-Hansens. They make welding easier, reduce the dependence on human skill.

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Hope We'll See You
BOOTH 504
Exhibit Hall
Machine Tool Show

Reinforcing Steel

Awards 87,550 Tons—New Projects 4300 Tons

AWARDS

Staten Island, N. Y., 325 tons, bars and mesh, for railroad bridges, to National Bridge Co.

New York, 300 tons, municipal incinerator.

Haverstraw, N. Y., 230 tons, school building, to Fireproof Products Co.

Reading, Pa., 750 tons, reservoir, to Taylor-Davis Co.

Chicago, 200 tons, Armstrong Paint Co. to Concrete Engineering Co.

Alton, Ill., 1300 tons, dam, to Illinois Steel Co.

Chicago Heights, Ill., 180 tons, sewage plant, to Inland Steel Co.

Los Angeles, 83,790 tons, Metropolitan Water District, Specification 109, 17,950 tons each to Blue Diamond Corpn. and Truscon Steel Co., 18,110 tons to Concrete Engineering Co., 17,780 tons to Soule Steel Co., 4000 tons each to Security Materials Co., Consolidated Steel Corpn. and J. W. Black.

Los Angeles, 381 tons, Department of Water and Power, to Concrete Engineering Co.

Hanford, Cal., 100 tons, reinforced concrete pier, to an unnamed bidder.

Panama, Canal Zone, 725 tons, materials only under Specification 3078, to an unnamed bidder.

NEW REINFORCING BAR PROJECTS

Fort Knox, Ky., 282 tons, bullion depository; bids this week.

State of Iowa, 900 tons, highway work.

State of Indiana, 400 tons, road work.

Oak Park, Ill., 140 tons, Goldberg store.

Chicago, 170 tons, Powers store.

Benton Harbor, Mich., 350 tons, bridge.

Chicago, 100 tons, addition to Griffiths Laboratories.

North Chicago, Ill., 115 tons, addition to Abbott Laboratories.

Fond du Lac, Wis., 100 tons, post office.

Rock Island, Ill., 735 tons, dam No. 11; Maxon Construction Co., Fayton, Ohio, low bidder on general contract.

Los Angeles, 326 tons, material for Metropolitan Water District, Specification 43648; bids advanced to Sept. 4.

State of Oregon, 217 tons, bridges in Clackmas and Douglas counties; bids Sept. 5.

Klamath County, Ore., 320 tons, State bridge over Klamath Falls River; bids Sept. 5.

State of Washington, 102 tons, bridges in two counties; bids Sept. 17.

The Allegheny Steel Co., Brackenridge, Pa., has acquired from undisclosed British interests exclusive American rights to manufacture and sell a new magnetic alloy steel. The high magnetic permeability of this new steel, which is known as Allegheny "Mumetal," an alloy of nickel, copper and iron, when used in radio, instrument and sound apparatus transformers, is said to increase tonal qualities and accuracy.

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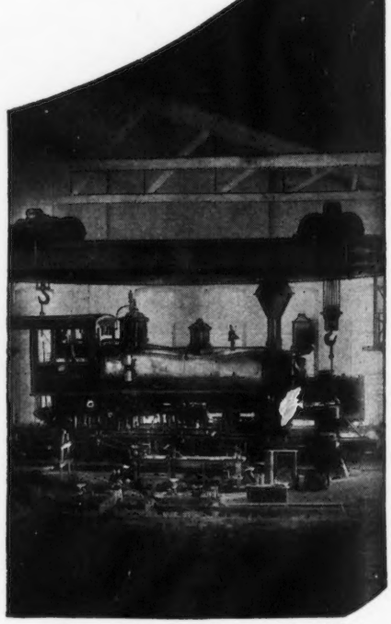


40-ton crane in Union Pacific Shops at Cheyenne; built in 1890.

Hope We'll See You
BOOTH 504
Exhibit Hall
Machine Tool Show

Demand Lags in New York District

Bar and Galvanized Sheet Cards Are Revised But Otherwise There Are Few Price Changes for Next Quarter

NEW YORK, Sept. 4.—Most producers have reaffirmed prices for fourth quarter delivery. The only changes reported are new quantity discounts on hot-rolled bars, a $3 a ton advance in railroad axles to 2.80c. a lb. base, Pittsburgh or Chicago, and the removal of the $2 a ton jobbers' deduction on galvanized sheets effective Oct. 1. Under the new bar card, quantities under 25 tons to 10 tons take the base price, which will be 1.85c., or $1 a ton above the present base. However, on larger quantities there will be deductions ranging from 5c. to 10c. per 100 lb., the latter applying to orders of 100 tons and over. The new schedule is for fourth quarter business but will apply to third quarter contracts where it results in lower net prices.

Provision of quantity deductions on bars is intended to stimulate the placing of larger individual orders. At the present time an unusually larger percentage of bar orders is in small lots. A recent survey by one seller disclosed that 14 per cent of the number of all orders was for lots of 1 ton or less but that the tonnage involved represented only 1 per cent of total bookings. Orders for 1 to 3 tons represented 28 per cent of the number of orders and only 4 per cent of total bar tonnage booked. Less than one-quarter of the number of orders, but representing three-quarters of total tonnage booked, was for lots of 15 tons and over. It is not yet known whether the new quantity deductions will be applied in their present form to concrete bars or whether somewhat different discounts will be announced. While extremely small orders are not so common in strip and sheets, it is believed that the precedent set in the case of bars will cause large users, and particularly the motor car makers, to exert pressure for quantity differentials on the flat-rolled products.

Elimination of the jobbers' discount on galvanized sheets is in line with recent moves to eliminate preferentials unless they are directly related to quantity. The local galvanized sheet market has been demoralized for some time, not only because secondary sellers have passed on their allowance to the consuming trade but because of the growing demand for galvanized seconds to the exclusion of primes. Buyers apparently have no difficulty in obtaining seconds in just the sizes and gages desired. It is to be noted that buyers of primes must take a certain proportion of seconds, but buyers of seconds need not buy any primes.

Local selling offices are feeling the effects of the decline in tin plate demand. Miscellaneous demand continues to improve, with business in bar mill products more active than in flat-rolled products.

An incinerator on which the city of New York will take bids will require 2200 tons of structural steel and 300 tons of concrete bars. Federal funds have been made available for a new line of piers between Twenty-third and Forty-second Streets, Manhattan. The city department of docks will drive steel piles alongside wooden piles to test them before going ahead with the project.

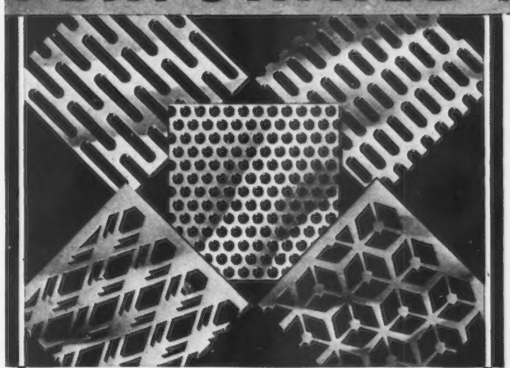
Pig Iron

Third quarter prices have been extended to the end of the year, and distributers' books are now open for fourth quarter accounts. With prices apparently very firmly established, consumers are now more willing to order ahead on their requirements. Current sales are at least twice as large as they were a year ago, with local furnace representatives having booked about 1750 tons last week for September delivery. This figure compares with 1250 tons taken in the preceding period and 2250 tons sold a fortnight ago. Several foreign brands are still being offered here at from $1 to $2 a ton lower than domestic grades.

Reinforcing Steel

New York and New Jersey have inaugurated fair-sized highway programs for the fall, and reinforcing steel distributers are consequently expecting considerably improved business in the fourth quarter. Small-lot ordering in this area is in fair volume, and a sizable amount of Federal-financed building is currently being let. National Bridge Co. will furnish 325 tons of bars and mesh for grade crossings on Staten Island, N. Y., and Fireproof Prod-

PERFORATED METALS



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ucts Co. has been awarded 230 tons for a school at Haverstraw, N. Y.

Scrap

There has been no abatement in price strength in this area. Brokers are paying well over $8.50 and $7.50 a ton for No. 1 and No. 2 steels in the adjoining New Jersey area for delivery to Coatesville and Claymont mills. Also bids alongside barges have risen to as high as $9 and $8 respectively in the Brooklyn and immediate New York area. Practically all of the old Japanese contracts have been liquidated, and little new business has matured to replace this lost tonnage. Italian deliveries continue moderately heavy, and England is still a very large outlet for steel and cast grades. Unless foreign mills come back into the market for large tonnages, there is little likelihood that prices here will show any significant increase in the next month. A continued strong tone in the West has influenced less-important grades to some extent here, but prices in Pittsburgh are still not high enough to draw a significant tonnage from this territory. A recent sale of breakable cast was made at $7.25, axles are listed 75c. higher, rails for rerolling have been sold at $10, and unprepared yard iron and steel is quoted $1 higher.

Operations in Further Rise in South

BIRMINGHAM, Sept. 4.—Open-hearth operations again have been stepped up, with the addition of two more, and 11 units of the 24 in the district are now producing steel. The Tennessee Coal, Iron & Railroad Co. and Gulf States Steel Co. each added one. The former is now operating seven out of nine at its Fairfield Works and the latter four out of six at Alabama City. The Ensley open-hearth plant, with nine units, has not been worked since the rail mill was closed in June. During August there was a gain of four units.

The general improvement in steel buying, which became noticeable early in August, is holding at a steady rate and now embraces heavier products, such as plates, shapes and bars, in addition to sheets and wire products. For both steel producers in the district August tonnage was the best in a considerable period.

The Seaboard Airline, which bought 6000 tons of rails from the Tennessee company in mid-August, has now placed orders for track accessories with that company and also with the Weir-Kilby Corpn.

Nashville Bridge Co. has booked 200 tons of structural steel for a State highway bridge in Montevallo, Ala. This company is also shipping transmission towers to the TVA, which requires about 1000 tons.

Last week the Virginia Bridge & Iron Co. completed shipments of steel for the powerhouse at Norris Dam, which amounted to 950 tons.

August pig iron shipments exceeded those of July by about 15 per cent. The market is slightly improved, but orders are still on a spot, small-lot basis.

Pressure pipe demand, still awaiting a step-up in PWA activities, was just about the same in August as in July. Shipments also ran about the same.

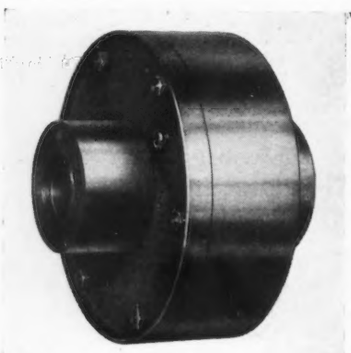
Sheet Demand Sustained In Southern Ohio

CINCINNATI, Sept. 4. — Removal of the jobbers' deduction of $2 a ton on galvanized sheets, effective Oct. 1, is expected to stimulate a rush to cover for sheet needs this month. Since other sheet prices have been affirmed at present levels, no change in the steady flow of business is noticed. Demand is running at a rate of about 60 per cent of capacity and is on a level with production. A slight improvement in automotive buying is heralded as the beginning of fall activity in the motor car industry. Refrigerator manufacturers give evidence of renewed interest in sheets, but the bulk of current business is still from miscellaneous, widely scattered sources.

Opening of fourth quarter books with pig iron quotations unchanged has revealed only a small interest in anticipatory sales. Of course, the intervention of a holiday may account for the failure of increased market activity to appear. Price advances during the fourth quarter are held to be inevitable because of freight surcharges and the anticipated influence of the Guffey bill on furnace costs. This feeling, however, has not stimulated outstanding buying interest, but may be the forerunner of a rush to cover before the full effect of cost advances is felt. Machine tool foundries, under the influence of slightly slower tool demand, are easing their melt, but melters feel a spurt is certain following the Machine Tool Show. Stove, automotive and agricultural implement melters are steadily engaged.

An early fall uptrend in warehouse business is looked for on the strength of unusually good summer demand. Bookings, while almost entirely industrial, cover a broad field of purchasing.

The district scrap market is without change. Dealer activity to obtain increased supplies in anticipation of fall buying is sustaining prices and contributing a strong tone to the market. Mills, however, are not disposed to enter the market and purchases are small and for urgent needs only.



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"IF IT'S A CLUTCH—WE MAKE IT"

Philadelphia Operations Level Off at 38 Per Cent

Budd Purchases Substantial Sheet Tonnage—Scrap Steadies at Higher Level—Pig Iron Sales Improve

PHILADELPHIA, Sept. 5.—Revision of extras on bars, galvanized sheets and wire products has led to the belief that similar changes will soon be inaugurated for other sheets, shapes and plates. The tendency of mills seems to be to establish sliding price scales dependent on the quantity of steel purchased. In this manner large buyers are afforded the benefit of savings effected when sufficient tonnages are ordered to permit economical mill operations. Such a plan also discourages the current practice of ordering only small-lot immediate requirements for quick delivery. Small warehouses will suffer from such an arrangement, as it forces them to either stock excessive quantities of steel or absorb a price differential.

Mill operations in this area are virtually unchanged from a week ago and the district rate is holding at 38 per cent of capacity. Worth continues to roll the output of two furnaces, Alan Wood is operating three units with the probability that one will soon be closed down for repairs, and American Bridge has four units operating and is rolling steel on both structural mills. Bethlehem is more active at Sparrows Point and expects to increase operations at Bethlehem. The Harrisburg producer has sufficient rolling orders to take care of the output of three furnaces.

Bolts and nuts are currently quiet. Prices quoted by many sellers are as low as they were during the low point of the depression.

Pig Iron

The recent improvement in ordering has been fully sustained. However, a great proportion of current tonnage is still confined to small lots, and furnace backlogs are consequently still none too heavy. Even though third quarter prices have been reaffirmed for the rest of the year, foundries and mills are showing no willingness to order far ahead. They are not as afraid of a price advance as are consumers in the West, for low-priced foreign iron in this area is considered sufficient to discourage increases in quotations. The Conshohocken furnace is barely able to supply the basic iron demands of Alan Wood Steel Co. and outside consumers, and will undoubtedly be in blast throughout the year.

Bars, Plates and Shapes

Lehigh Structural Steel Co. has sublet some of its recent tonnage of heavy girders to Phoenix Bridge Co. This latter company also has been awarded 150 tons of shapes for a railroad bridge at Peth, N. Y., and 206 tons for the Delilah bridge at Absecon, N. J. Pending tonnage includes 1000 tons for Camden, N. J., warehouses. Plates are only moderately active. Practically all of the requirements of the Virginian ferryboat have been placed, and Sun Shipbuilding Co. will let the 8000-ton requirements of the Gulf Oil Co. tankers within the next fortnight. Reinforcing bars are quiet. The major award of the week was for 750 tons to Taylor-Davis Co. for the Reading, Pa., reservoir. Thomas Steel Co. will supply 8350 tons for piling for a bulkhead at Wilmington, Del.

Sheets and Strip

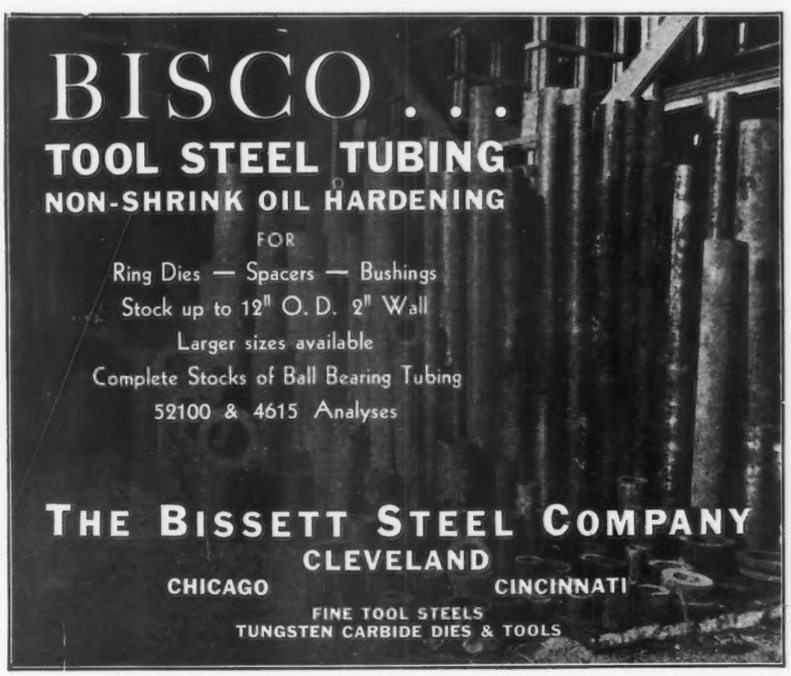
Budd Mfg. Co. purchased a large quantity of sheets during the week in preparation for the production of Ford, Studebaker, Plymouth, Dodge and Chrysler bodies. Alan Wood has shipped a sizable quantity of sheets to the Budd plant in order to establish a comfortable backlog for the production of Chevrolet frames. Miscellaneous sheet business has picked up to some extent, and mills are looking forward to a sustained demand over the next two months. Makers of light tanks are more active, and seasonal stove business has shown an encouraging improvement. All sellers insist that current price levels are being maintained, but reports of occasional concessions are still heard. The new schedule on galvanized sheets will go into effect on Oct. 1. The usual $2 a ton concession to jobbers will be supplanted by a quantity extra set-up outlined last week.

Imports

The following iron and steel imports were received here last week: 47 tons of steel tubes, 18 tons of steel bars and 12 tons of steel forgings from Sweden, and 6 tons of drill steel from Norway.

Warehouse Business

Most warehouses report a post-holiday lull in buying. It is expected, however, that ordering will soon return to a more normal level. Average August bookings were only slightly above July volume, but September business is expected to show an encouraging increase. No



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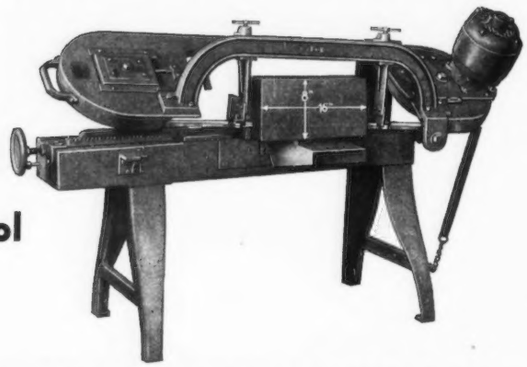

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THREE RIVERS MICHIGAN

changes from quoted price levels have been made. At present, galvanized sheets and hot and cold-rolled sheets are in the most demand. Most warehouses are dissatisfied with the recently announced bar extras inasmuch as it forces them either to stock large quantities of material or absorb sizable quantity extras.

Scrap

Higher broker bids to cover outstanding contracts have failed to free supplies to any significant extent. Dealer deliveries continue restricted even though $12 is freely offered for No. 1 and well over $11 is available for No. 2 steel. Under these conditions, the strength of this market is based on the probability that brokers will hold out for well over $12 on their next mill sale. The market may then tend to level off as furnace operations will not likely increase to any extent, export business is no longer a support to the market and mills are generally well covered for the next six weeks. Stove plate has been sold at Harrisburg for $9.50, brokers are paying $11 freely for heavy breakable cast for Coatesville and Harrisburg delivery and couplers and knuckles have been sold recently as high as $15 a ton. The Budd company's offering of compressed bundles went for well over $11 a ton, but ordinary bundles are quotably unchanged inasmuch as their quality is not considered comparable.

Huge Reinforcing Bar Award on Coast

SAN FRANCISCO, Sept. 3.—The award of 83,790 tons of reinforcing steel has just been announced by the Metropolitan Water District of Los Angeles. The huge tonnage was divided among seven bidders as follows: 17,950 tons each to Blue Diamond Corpn. and Truscon Steel Co., 18,110 tons to Concrete Engineering Co., 17,780 tons to Soule Steel Co. and 4000 tons each to Security Materials Co., Consolidated Steel Corpn. and J. W. Black. Delivery is to be made before Jan. 1, 1939.

The award is subject to the approval of the Reconstruction Finance Corporation. The district's board of directors tentatively has instructed distributers to purchase 8000 tons of the total from Jones & Laughlin Steel Corpn., 4000 tons from Carnegie Steel Co., 7000 tons from Bethlehem Steel Co., 11,000 tons from Republic Steel Corpn., and 2180 tons from Youngstown Sheet & Tube Co.

At the same time the district rejected bids for the furnishing and fabricating of 5500 or 5750 tons of structural steel for the transmission towers. It is believed that the towers may be redesigned and new bids called for.

Consolidated Steel Corpn. has been awarded 700 tons of shapes for an aircraft factory at Mines Field near Los Angeles. The Los Angeles Department of Water and Power has let 381 tons of bars to Concrete Engineering Co. No award has yet been made of the 1131 tons of bars required for the mint at San Francisco.

Few new projects have been added to the pending list. Ben C. Gerwick is again the low bidder for the United States Coast Guard bulkhead to be constructed at Government Island, Cal. From 2800 to 3200 tons of sheet piling is involved.

Warehouse activity is favorable and mill prices are steady. It is generally believed that many projects, made possible by Federal allotments, will get under way during the last quarter.

A. F. of L. Organizes New Union For Automobile Workers — Green Wins Out

DETROIT, Sept. 4.—Delegates from the local automobile unions of the American Federation of Labor formed the International Union of United Automobile Workers of America at their constitutional convention in Detroit last week.

The majority of delegates led by the groups from Toledo and South Bend, Ind., opposed national control of the new union and sought the privilege of selection of their own leaders, particularly rejecting the suggestion of President William Green of the Federation that Francis J. Dillon, national organizer at Detroit, be made president. Mr. Green, however, insisted that if the new international was to receive a charter from the Federation and be partly financed through its early days by the national treasury, it must accept Mr. Dillon as its head and must heed the advice of the national executive council. The delegates finally bowed to Mr. Green's wishes after he had agreed to appoint their original choice for president, Homer Martin, of Kansas City, as vice-president.

During a so-called probationary period, probably lasting one year, Mr. Dillon's salary of $6,500 and expenses of a Detroit office are to be paid by the Federation's national office. All other expenses, including salaries of $4,500 each for the vice-president and for the secretary, are to be paid by the new union. Dues are to be $1 a month with 35c. per capita being paid by the local unions to the international union.

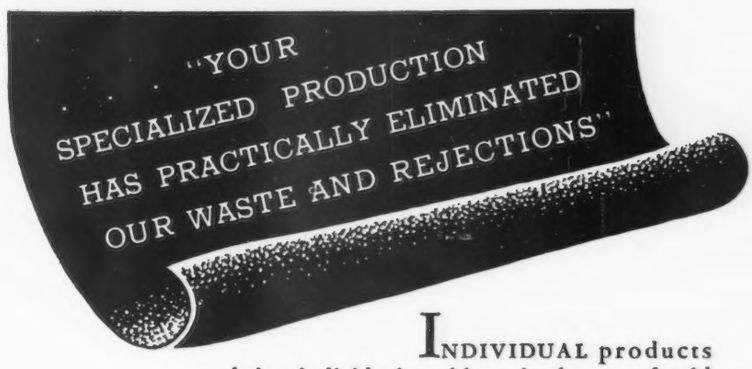
Members of the executive committee are to receive $10 a day while in session and any members called for special service by the union are to get $8 a day. The new union is to have no authority over crafts unions of the A. F. of L. in the automobile industry and according to its charter is not to take in such skilled workers as members. As a matter of fact, however, the membership of many locals now contains many skilled craftsmen, some of whom were delegates to the constitutional convention and these locals have no intention of surrendering their members to craft unions. If the A. F. of L. wants to enforce its ruling in favor of craft unions it will rest with the national executive council in Washington to take the necessary disciplinary action.

The split in the convention between the rank and file and the conservatives with Mr. Green forcing the will of the national organization on the former means that most of the new unions' attention in the coming months must be devoted to healing factional wounds and securing unification rather than to taking aggressive action against car manufacturers. From this standpoint the outlook for labor peace the coming season is very hopeful. It must be recognized, however, that the Toledo strike, led by undisciplined local officers last April, broke out unexpectedly and a similar occurrence at any time is entirely possible.

Mr. Dillon reported paid up membership of 30,000. The rank and file won their fight to have South Bend chosen as the next convention city.

Rival Union Formed

The new union which grew out of the Automobile Labor Board's bargaining agency at Dodge Broth-

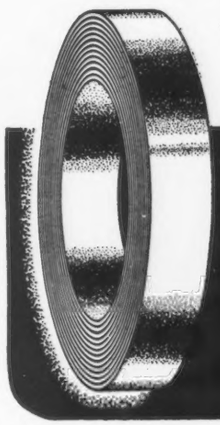


INDIVIDUAL products bring individual problems in the use of cold rolled strip steel. The material must consistently meet each requirement of product and production if the minimum of cost and certainty of product uniformity are to be realized.

Thomastrip is the product of a specialized strip steel mill. The specifications determined by your production needs are incorporated with true uniformity of temper, accuracy of gauge and fineness of finish in the cold rolled strip steel delivered to your machines.

The skill, experience and individualized attention of Thomas specialized production should prove to be of advantage to you. A Thomas representative is ready to discuss your requirements with you without obligation.

Test Thomastrip for your product. Send for test samples. Specify gauge, width, temper and finish desired.



THE THOMAS STEEL CO. · WARREN, O.
SPECIALIZED PRODUCERS OF COLD ROLLED STRIP STEEL

THOMASTRIP
STRIP COLD ROLLED STEEL
BRIGHT FINISH » ZINC COATED
COPPER COATED » CADMIUM COATED

ers claims a membership of 20,000 and has issued charters to 21 locals. It reports locals formed in several Chrysler plants, Packard, Chevrolet, Graham-Page, Briggs and Murray Body. It has been pledged the support of Father Coughlin's National Union for Social Justice. The new union, if it accepts Father Coughlin's advice, will have dues of 50c. a month payable when members are working and will employ a staff of research workers, economists, lawyers and accountants, and will have experienced men represent its members in collective bargaining with managements. The A. F. of L. looks upon Father Coughlin as a tool of car manufacturers in sponsoring this new union.

Harbor Development Would Benefit Many

THE project for the development of a public harbor in Lake Michigan near Gary, Ind., mentioned in THE IRON AGE last week, was not instigated by the Midwest Steel Corpn. for its sole benefit, according to a later report. The proposal would help to develop an extensive industrial district in northern Indiana and its sponsor is a public organization known as the Northern Indiana Industrial Development Association which is composed of individuals and a number of civic and business organizations in that district.

The Midwest Steel Corpn.'s only connection with the matter was to acquiesce in the construction of the public harbor, rather than to oppose it in favor of the private harbor that was contemplated in plans for a plant of its Lake Michigan site.

Detroit Steel Plant Buys Scrap

DETROIT, Sept. 4.—The local steel plant has purchased a round tonnage of heavy melting steel and hydraulic bundles. Otherwise the market has been relatively quiet, with prices firm and mostly unchanged. Automotive cast has advanced 50c. a ton and now is quoted at $12.50 to $13.

Ryerson Stockholders Approve Merger

STOCKHOLDERS of Joseph T. Ryerson & Son, Inc., Chicago, have approved the proposed merger with Inland Steel Co. All shares present at the meeting, about 92 per cent of the total outstanding, voted for the plan.

Fabricated Structural Steel

Awards Again Decline—New Projects Higher

LETTINGS of 8825 tons, which compare with 12,400 tons last week, are mostly for public work. The largest booking is 3550 tons for a dam at Burlington, Iowa. New projects of 15,520 tons compare with 14,720 tons in the previous week and 9197 tons two weeks ago. Among new jobs reported are 2800 tons for a dam at Rock Island, Ill., 2500 tons for the Torrence Avenue bridge in Chicago and 2200 tons for a municipal incinerator in New York. Plate lettings of 12,200 tons include 7500 tons for 30 barges for the Mississippi Valley Barge Line, St. Louis, and 4500 tons for a gas holder at Dearborn, Mich., for the Ford Motor Co. Structural steel contracts in August totaled 73,378 tons compared with 61,150 tons in July and 70,815 tons in June. Structural steel awards for the week follow:

NORTH ATLANTIC STATES

Salem, Mass., 150 tons, bus garage for Eastern Massachusetts Street Railway Co., to Boston Bridge Works, Inc.

Peth, N. Y., 150 tons, bridge for Baltimore & Ohio Railroad, to Phoenix Bridge Co.

Schenectady, N. Y., 320 tons, shop extensions for American Locomotive Co., to Pittsburgh Bridge & Iron Co.

Delaware & Hudson Railroad, 525 tons, bridge at Sidney, N. Y., to American Bridge Co.

Pottsville, Pa., 180 tons, mill house for Yuengling & Sons, Inc., to McClintic-Marshall Corpn.

McKees Rocks, Pa., 200 tons, building for Socony Vacuum Oil Co., to Pittsburgh Bridge & Iron Co.

Abescon, N. J., 206 tons, Delilah bridge, to Phoenix Bridge Co.

Amcelle, Md., 285 tons, building for Celanese Corpn., to Belmont Iron Works.

SOUTH AND SOUTHWEST

State of Tennessee, 1130 tons, Clinch River and Sycamore Creek bridge for TVA, to McClintic-Marshall Corpn.

Harlan County, Ky., 105 tons, State highway bridge, to Vincennes Bridge Co.

Ingleside, W. Va., 150 tons, bridge for Virginian Railroad, to Virginia Bridge & Iron Co.

Montevallo, Ala., 200 tons, State highway bridge, to Nashville Bridge Co.

Tempe, Ariz., 260 tons, buildings at Arizona Teachers College, to an unnamed bidder.

CENTRAL STATES

Elyria, Ohio, 365 tons, factory building for Western Automatic Machine Screw Co., to Fort Pitt Bridge Works Co.

Cincinnati, 110 tons, memorial church, to Ingalls Iron Works Co.

Burlington, Iowa, 3550 tons, dam No. 18, to American Bridge Co.

Vermillion County, Ill., 160 tons, bridge, to Worden-Allen Co.

Barber County, Kan., 320 tons, highway bridge, to George C. Christopher & Son.

WESTERN STATES

Matanuska, Alaska, 550 tons, bridge, to Duffin Iron Works.

Honolulu, T. H., 115 tons, library, to Honolulu Iron Works.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

State of Massachusetts, 1000 tons, highway projects.

New York, 750 tons, pier shed No. 25 for Eastern Steamship Line.

New York, 2200 tons, municipal incinerator.

Pittsburgh, 7200 tons, Homestead-Pittsburgh high level bridge; American Bridge Co. low bidder.

Munhall, Pa., 500 tons, cranes.

CENTRAL STATES

Apple Creek, Ohio, 100 tons, building for State sanitarium; bids Sept. 9.

Meredosia, Ill., 2100 tons, Morgan-Pike County bridge over Illinois River; bids Sept. 17.

Rock Island, Ill., 2800 tons, dam No. 11; Maxon Construction Co., Dayton, Ohio, low bidder on general contract.

Chicago, 2500 tons, Torrence Avenue bridge.

State of Indiana, 250 tons, three bridges.

Columbus Junction, Iowa, 900 tons, bridge.

Dubuque, Iowa, 4000 tons, dam; R. C. Mahon Co. low bidder.

Genoa, Wis., 2000 tons, dam; Treadwell Engineering Co. low bidder.

Jamestown, N. D., 350 tons, hospital.

State of Missouri, 2100 tons, Lake-of-the-Ozarks bridge; bids Sept. 6.

WESTERN STATES

Grangeville, Idaho, 200 tons, State highway bridge.

State of Montana, 440 tons, bridges at Shelby and Norris.

Denver, 1700 tons, custom house and mint addition; United States Fireproofing Co. general contractor.

Salinas, Cal., 105 tons, post office; bids opened.

Salinas, 350 tons, bridge.

Los Angeles, 5500 or 5750 tons, transmission towers for Metropolitan Water District; bids rejected and will be readvertised.

Los Angeles, 350 tons, tunnel beams, Commercial Shearing & Stamping Co. low bidder.

State of Oregon, 173 tons, bridges in three counties; bids Sept. 5.

Grand Coulee Dam, Wash., 450 tons, crib frames.

FABRICATED PLATES

AWARDS

Dearborn, Mich., 4500 tons, 10,000,000 cu. ft. gas holder for Ford Motor Co., to McClintic-Marshall Corpn.

State of Ohio, 205 tons, tanks for Socony-Vacuum Co., to Pittsburgh Bridge & Iron Co.

St. Louis, 7500 tons, 30 cargo barges for Mississippi Valley Barge Line, to American Bridge Co.

NEW PROJECTS

Washington, 200 tons, pipe line; American Locomotive Co. low bidder.

St. George, Utah, 900 tons, 11.5 mile pipe line; bids opened Aug. 31.

Denver, 100 tons, radial gates for Rye Patch dam, Specification 703D; bids opened.

Everett, Wash., 1100 tons, 24 and 36-in. pipe line; bids cancelled and will be readvertised.

Everett, 200 tons, pipe line from reservoir No. 2 to Weyerhaeuser pulp mill; bids opened Sept. 2.

Los Angeles, 500 tons, water stops for Metropolitan Water District; Consolidated Steel Corpn. low bidder.

Malukona, T. H., 300 tons, pipe line; bids opened.

SHEET PILING

Huron, Ohio, 200 tons, Wheeling & Lake Erie Railroad, to Carnegie Steel Co.

Wilmington, Del., 2350 tons, bulkhead, to Thomas Steel Co.

Government Island, Cal., 3000 tons sheet piling, United States Coast Guard Bulkhead; Ben C. Gerwich low bidder on general contract.

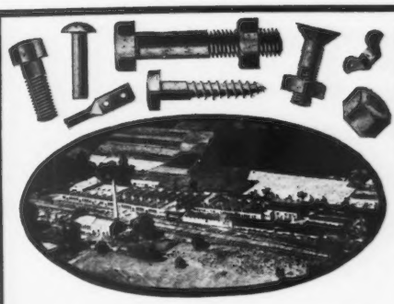
The Products

The Plant

The Question

The Name

The Location



Do you use such products and do you appreciate quality, prompt deliveries, attention and perfect packaging?

If so, write

CLARK BROS BOLT CO.

CLARK STREET
MILLDALE, CONNECTICUT

Boston Export Scrap Market Strengthens

BOSTON, Sept. 3.—The holding back of offerings by owners of exportable scrap in anticipation of higher prices met with some success the past week, as scattered sales of No. 1 steel were made at $9.50 a ton, delivered dock, and of No. 2 steel at $8.50, advances of 25c. a ton above previous top prices. However, some business was put through at $9 to $9.25 a ton, and $8 to $8.25 a ton, respectively, but presumably on old offers. A boat scheduled to leave here last week with about 6000 tons for Italy, will not clear until the latter part of this week. Another boat with 5000 tons, mostly rails, 2000 tons of which was loaded at Portland, Me., sailed for Italy last week. Most of the scrap will be landed at Savona, Italy, and the remainder, rails, at Alexandria for Egyptian railroads. At Providence, R. I., 1500 tons of scrap earmarked for export will be loaded into barges this week for Pennsylvania delivery.

Offers for No. 1 steel for eastern Pennsylvania delivery are in this market at $12 a ton, or $7.29 a ton, f. o. b., and for Pittsburgh district delivery, at $13.50 to $13.75 a ton, delivered, but no business has resulted. The American Steel & Wire Co., Worcester, Mass., still offers $9 a ton delivered for No. 1 steel, and $8 for No. 2, but recently has obtained only No. 2 in limited quantities. The market for steel turnings and bundled skeleton for Pittsburgh district delivery has moved up another peg, but scrap prices otherwise have not changed noticeably. Brokers insist the Pittsburgh market outlook is brighter than in months.

Pig iron buying is in occasional carload lots, the aggregate being small. Contrary to expectations of furnace representatives, real inquiries for fourth quarter delivery have not developed.

New Quantity Deductions and Extras on Hot-Rolled Bars

THE Carnegie Steel Co. has initiated a new setup covering revised prices and extras for hot-rolled carbon steel bars, effective Sept. 3 on fourth quarter business. The base price for fourth quarter will be advanced $1 a ton to 1.85c. a lb., base, Pittsburgh, subject to the usual list of extras, excepting an innovation in the schedule of extras for quantity. This new feature covers certain deductions which reflect to the buyers' economies effected in mill operations on large tonnages and is the result of prolonged study of costs as related to quantities produced.

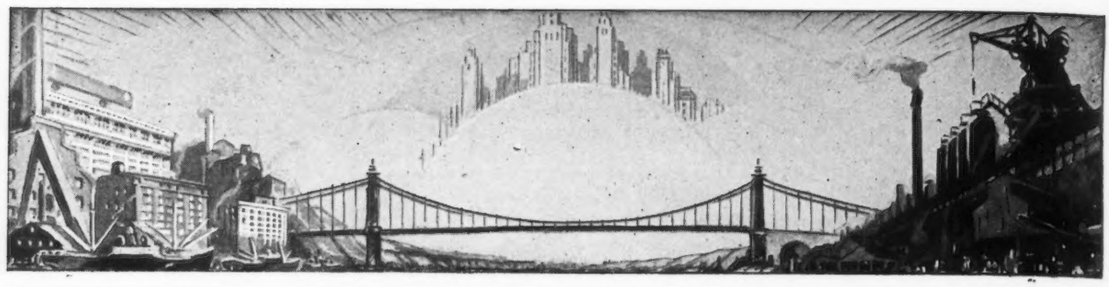
The base price of 1.85c. a lb. will apply to 20,000 to 49,999 lb. No changes have been made in the lower quantity brackets from less than 1000 lb. to 5999 lb. New quantity extras of 7½c. a 100 lb. on 6000 to 9999 lb., and 5c. on 10,000 to 19,999 lb. will be applied. The setup provides for deductions of 5c. a 100 lb. on 50,000 to 99,999 lb.; 7½c. on 100,000 to 199,999 lb., and 10c. on quantities in excess of 200,000 lb.

These quantity extras and deductions are to be determined by the total weight of the size ordered of one grade or analysis released for shipment to one destination at one time. On quantities up to 10 tons, shipment of 10 per cent over or under, and on quantities 10 tons and over, shipment of 5 per cent over or under is permissible.

The deductions will be applied immediately if tonnage released against third quarter contracts on and after Sept. 3 shows a lower net price on 1.85c. per lb., base, Pittsburgh. The new extras and deductions follow:

Quantities	Deduction Per 100 Lb.
100 tons and over	10c.
Under 100 to 50 tons	7½c.
Under 50 to 25 tons	5c.
Under 25 to 10 tons	Base

Quantities	Extra Per 100 Lb.
Under 10 to 5 tons	5c.
Under 5 to 3 tons	7½c.
Under 3 to 2 tons	10c.
Under 2 to 1 ton	20c.
Under 1 ton to 1000 lb	50c.
Under 1000 lb	$1



Plant Expansion and Equipment Buying

Machine Tool Inquiry Heavy with Large Orders in Prospect After Show

WHILE the placing of scattered orders for machine tools has been reported during the week, business generally is being deferred until after the Cleveland show. Inquiries continue to accumulate and some sellers believe that practically all of the country's industrial plants will have a list of some sort out before the end of the year.

The Electro-Motive Corpn., Chicago, has placed additional tools for its locomotive plant now under construction and the International Harvester Co. is placing orders from time to time for nearly all of its plants. A list is in preparation for Moline, Ill. Bids have been taken for 14 turret lathes and other machinery for a naval aircraft plant at Philadelphia.

NORTH ATLANTIC

Fisher Body Division, General Motors Corpn., Detroit, plans two one-story additions to branch plant at Tarrytown, N. Y., for body manufacture for Chevrolet automobiles. Chevrolet Motor Co., also a division of General Motors Corpn., has plans for one-story addition to Tarrytown works, adjoining Fisher Body plant. Entire project will cost over $1,500,000 with equipment. Buildings are scheduled for completion in November.

A. P. W. Paper Co., 1273 Broadway, Albany, N. Y., will soon take bids for two-story and basement extension, 200 x 300 ft. at Liberty mill, where production from North Albany will be transferred. Cost over $400,000 with equipment. Johnson & Wierk, Grand Central Terminal, New York, are consulting engineers.

Board of Education, Park Avenue and Fifty-ninth Street, New York, plans manual training department in new three-story elementary high and grade school in Brooklyn. Fund of $929,700 has been secured through Federal aid for building and equipment. W. C. Martin, Flatbush Avenue Extension and Concord Street, Brooklyn, is architect and superintendent for board.

Department of Correction, Municipal Building, New York, has filed plans for one-story mechanical and general shop, 119 x 230 ft., on Riker Island. Cost about $87,000 with equipment. L. Rosen is architect for department.

Horni Signal Mfg. Co., 515 Greenwich Street, New York, manufacturer of signal devices and equipment, metal signs, etc., is considering extensions and improvements in plant, including additional equipment. Cost close to $30,000.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Sept. 10 for pressure gages (Schedule 5822), 10,000 ft. single-conductor cable, 5000 ft. triple-conductor cable, and 1000 ft. triplex flame-proof cable (Schedule 5870); until Sept. 17, electric arc welding set and spare parts (Schedule 5897) for Brooklyn Navy Yard; until Sept. 10, 254 pressure gages and 900 cylinder valves (Schedule 5821) for Brooklyn and Mare Island yards; until Sept. 13, seven airplane electro hydraulic handling winches and spare parts (Schedule 5833) for Brooklyn, Philadelphia and Charleston navy yards.

American Oil Co., 122 East Forty-second Street, New York, has begun erection of new bulk oil storage and distributing plant on 40-acre tract at East Greenbush, near Troy, N. Y., to include dock and unloading facilities, several buildings and shops, steel tanks and other units. Cost over $200,000 with equipment.

Signal Supply Officer, Army Base, Brooklyn, N. Y., asks bids until Sept. 13 for radio transmitting and receiving equipment (Circular 25); until Sept. 16, keying heads, keying head drivers, tape pullers, tape rewinders, tape recorders, tape reels, one motor-generator unit, one link circuit relay and other equipment (Circular 17), one gasoline engine-driven power unit and radio transmitting and receiving equipment (Circular 23); until Sept. 23, 31,000 ft. cable and 22 reels (Circular 21).

Commanding Officer, Watervliet Arsenal, Watervliet, N. Y., asks bids until Sept. 23 for plain plug gages, plain ring gages, thread plug gages, tape gages and special gages (Circular 10).

Delco-Remy Corpn., Anderson, Ind., manufacturer of automobile batteries and parts, starting and lighting equipment, etc., has acquired former one-story plant of American-La France Co., Bloomfield, N. J., totaling about 80,000 sq. ft. floor space, and will remodel for new Eastern branch works. Cost over $75,000 with machinery. Company is a subsidiary of General Motors Corpn.

City Commission, City Hall, Newark, N. J., plans extensions and improvements in Newark Airport, including five new hangars, with shop and reconditioning facilities, four of which will replace preset units. Cost close to $4,000,000 with equipment, of which about $3,360,000 will be arranged through Federal aid. M. C. Ellenstein, mayor, is in charge of project.

Purchasing and Contracting Officer, Air Corps, Middletown Air Depot, Middletown, Pa., asks bids until Oct. 1 for two 10-ton and one 5-ton electric traveling cranes, one 3-ton single girder electric bridge, six 10-ton and three 1-ton electric hoists, 20 3-ton push-type trolleys, and one 2-ton elevator hoist (Circular 4).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Sept. 10 for one motor-driven, single-spindle automatic screw machine and extra equipment (Schedule 5900), one motor-driven, automatic multiple-spindle screw machine (Schedule 5901) for Philadelphia Navy Yard.

Weldall-Sprarite Engineering Service, recently organized, has taken over a building at 42-51 Hunter Street, Long Island City, N. Y., to engage in welding, metal-coating and machine work. Frederick E. Wright is head of company.

BUFFALO DISTRICT

National Cellulose Corpn., 366 Fifth Avenue, New York, manufacturer of cellulose transparent paper products, with main plant at Baldwinsville, N. Y., has leased former factory of Cyrabord Co., Syracuse, N. Y., for new paper converting plant. John J. Sullivan, manager of Baldwinsville plant, will be in charge at new works.

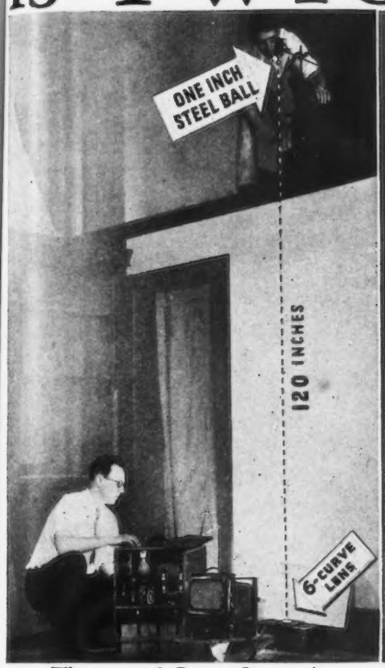
Board of Education, Avon, N. Y., plans manual training department in new two-story high school. Cost about $125,000. Financing is being arranged through Federal aid. Bley & Lyman, 505 Delaware Avenue, Buffalo, are architects.

Consolidated Aircraft Corpn., 2050 Elmwood Avenue, Buffalo, has begun removal of works to San Diego, Cal., where plant is being completed on 22-acre tract at Lindbergh airfield. Operations will be concentrated at latter works.

NEW ENGLAND

Ludlow Mfg. Associates, Ludlow, Mass., manufacturers of jute and cotton webbing, burlap products, etc., have purchased 53-acre tract at Edge Moor, Wilmington, Del., with frontage on Delaware River, as site for new plant, consisting of several one and two-story units, with main mill, two-stories, 400 x 600 ft., power house, pumping station, machine shop and other departments. Cost over $1,500,000 with machinery. Part of present plant at Ludlow will be removed to new location later. M. B. Stone is treasurer.

New *6-Curve Super Armorplate* Goggle Lens is TWICE AS STRONG



Stop-Motion Photo Shows Impact of Test Ball

A one-inch solid steel ball drops on the lens—from a height of 10 feet. *The height is 3 times the Government test. The ball is four times the standard weight.* This unretouched stop-motion photo, taken by Prof. H. E. Edgerton of Massachusetts Institute of Technology, shows what happens. The camera caught the action about .0002 of a second *after* impact. The ball is rebounding . . . the 6-Curve Super Armorplate Lens is unharmed. 6-Curve Super Armorplate lenses withstand impact again and again. Exposure time for this photo: 1/100,000 second. *Below:* the 6-Curve Super Armorplate Lens has 4 times the standard curvature, is more than twice as strong. Patented.

The new 6-Curve Super Armorplate Lens is here . . . a *deeply curved* lens with virtually *twice* the impact resistance of the strongest lens ever used before as standard equipment in American Optical Company goggles.

Objects of twice the *weight* . . . or flying twice as *fast* . . . leave the new 6-Curve Lens unharmed.

6-Curve Super Armorplate Lenses are now available as optional equipment in all new American Optical Company goggles . . . and as replacement lenses for goggles now in service. *All* your workers can have its advantages . . . its more certain deflection of flying particles . . . the liberal eyelash clearance . . . the clear, normal, comfortable vision.

Save eyes and save money. Ask the American Optical Company industrial representative stationed at the branch office near you to show you this new lens . . . explain what it means in terms of the dollars it will save for you.

American Optical Company

Manufacturers, for more than 100 years, of products to aid and preserve vision. Factories at Southbridge Mass. In Canada, Consolidated Optical Co., Ltd. Branch offices in all principal industrial centers

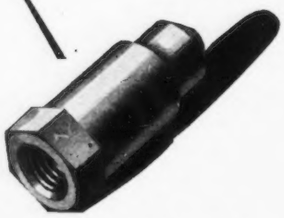
1841

AQUAPLANING is the ace of water sports, and there's a "thrill-a-second" in trailing a speed-boat at a mile a minute through clouds of spray.

And B & L Ultra-Cut is the "Ace of Machining Steels," which is setting new records in pieces per hour for the manufacture of finely finished machine parts.

It is developed for the express purpose of increasing the output of automatic screw machines without sacrifice of quality in the finished product. It enables you to get more from your present equipment, and to take advantage of the higher speeds for which the newer types of machines are built.

Ask for Ultra-Cut Folder No. 3-A.



Fabricated from 7/16" hexagon Ultra-Cut Steel at a cutting speed of 257 S.F.M. Time per piece 4¼ seconds. Finer finish obtained and tool life increased 20% by substituting Ultra-Cut for the former screw stock.

BETTER MADE STEELS LABORATORY TESTED

COLD DRAWN BARS AND SHAFTING • ULTRA-CUT STEEL • FREE-CUTTING SCREW STOCK • EXTRA WIDE FLATS • SPECIAL SECTIONS • ALLOY STEELS

BLISS & LAUGHLIN, INC.

HARVEY, ILL. *Sales Offices in all Principal Cities* **BUFFALO, N.Y.**

Commanding Officer, Watertown Arsenal, Watertown, Mass., asks bids until Sept. 9 for roller thrust bearings and radial roller bearings (Circular 84).

State Department of Health, State House, Boston, plans extensions and improvements in steam power house at State hospital at Danvers, Mass., including new boilers and other equipment. Cost about $150,000. Similar work will be carried out at steam power plant at State hospital, Taunton, Mass., with installation of new equipment. Cost about $120,000. Financing will be arranged through Federal aid.

Edgo, Inc., New Haven, Conn., has been organized by C. A. Kuhn, 530 Elm Street, and John D. McHugh, 120 Dwight Street, to manufacture edge tools.

Commanding Officer, Springfield Armory, Springfield, Mass., asks bids until Sept. 9 for grinding wheels (Circular 18).

City Council, Danbury, Conn., plans extensions and improvements in municipal airport, including hangar and shop facilities. Fund of $100,000 has been arranged through Federal aid.

WESTERN PA. DIST.

Jamestown Specialty Co., Greenville, Pa., manufacturer of boats, canoes, etc., is planning one-story factory at Zelienople, Pa., for manufacture of automobile trailers, a new line of output, including parts production and assembling. Cost over $25,000 with machinery.

R. S. Evans, president, Evans Motors Co., Atlanta, Ga., and associates, recent purchasers of former plant of American Austin Car Co., Butler, Pa., plan early purchases of machinery and tools to cost over $200,000, in connection with modernization and improvements. Plant will be given over to production of parts for present Austin cars, and to parts manufacture and assembling for new small type automobile. Company will be organized to operate plant.

City Council, McMechen, W. Va., will call special election in September to vote bonds for $105,000 for new municipal electric light and power plant, and distributing system. Three Diesel engine-generator units with auxiliary equipment will be installed. J. M. Jenckes is electrical engineer.

SOUTH ATLANTIC

City Council, Abbeville, S. C., plans new municipal hydroelectric generating plant on Rocky River, where site is being secured, including transmission line to city, power substation and distributing facilities. Cost about $350,000. Financing is being arranged through Federal aid.

United States Engineer Office, Jacksonville, Fla., asks bids until Sept. 10 for steel sheet pile boat basin, 53½ x 104¾ ft., at Mayport, Fla. (Circular 74).

Sowega Fertilizer Corpn., Valdosta, Ga., plans addition to double present capacity. Extensions will also be made in storage and distributing department. Cost over $45,000 with equipment.

Swift & Co., Union Stock Yards, Chicago, have awarded general contract to S. S. Jacobs Co., Hildebrandt Building, Jacksonville, Fla., for new three-story branch plant, 60 x 95 ft., at Augusta, Ga. Cost close to $70,000 with equipment.

City Council, Miami Beach, Fla., asks bids until Sept. 11 for motor-driven pumping machinery and auxiliary equipment for municipal waterworks. C. A. Renshaw is city manager.

SOUTHWEST

Current River Power Co., 1105 R. A. Long Building, Kansas City, Mo., has applied for permission to proceed with construction of proposed hydroelectric generating plant on Current River, Ripley County, where site has been selected. Project will include transmission lines in Ripley, Shannon and Carter counties, with power substation and switching facilities. Cost over $2,000,000.

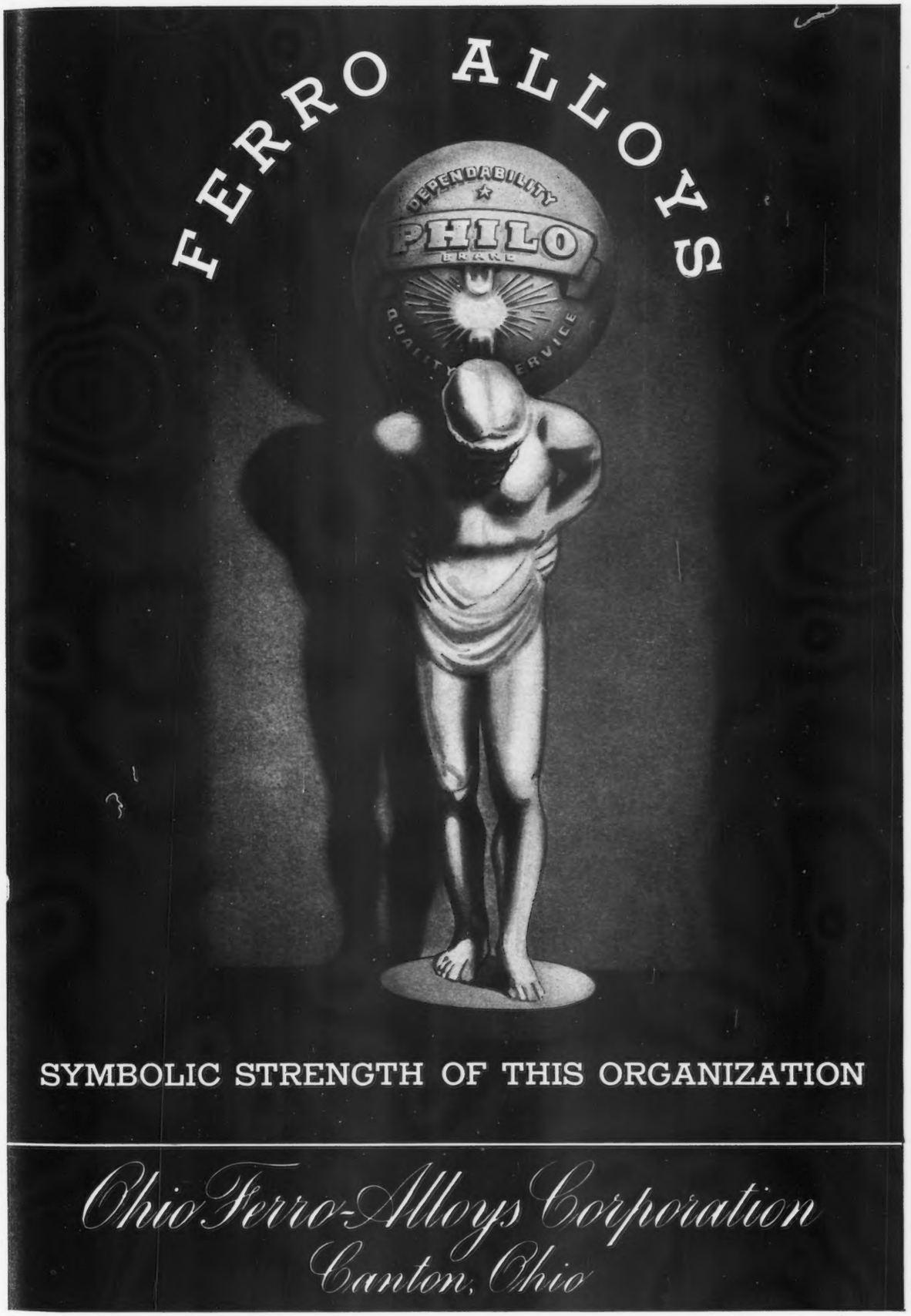
Board of Education, Library Building, Kansas City, Mo., has plans for two- three and four-story manual training school addition. Cost about $300,000 with equipment. Financing has been arranged. C. A. Smith, Finance Building, is architect.

City Council, Kirksville, Mo., plans new municipal electric light and power plant, including distribution system. Cost about $450,000. Financing is being arranged through Federal aid. Black & Veatch, 4706 Broadway, Kansas City, Mo., are consulting engineers.

Chevrolet Motor Co., 3044 West Grand Boulevard, Detroit, has awarded general contract to J. A. Utley, 6031 Mansur Avenue, Detroit, for extensions and improvements in factory branch at St. Louis. Cost about $40,000 with equipment. Company has superstructure under way for two-story and basement addition to branch assembling works at Leeds, Mo.; cost over $100,000 with equipment. Fisher Body Co., Detroit, an affiliated organization, is also erecting a two-story and basement addition to branch works at Leeds, 40 x 1000 ft., to cost over $300,000 with machinery.

Common Council, Burlingame, Kan., plans addition to municipal electric light and power plant, with installation of 300-hp. generator unit and auxiliary equipment. Cost close to $51,000. Financing is being arranged through Federal aid. Black & Veatch, 4706 Broadway, Kansas City, Mo., are consulting engineers.

Board of Education, Waco, Tex., H. M. Richey, chairman, plans manual training department in new two-story junior high school. Cost about $170,000. Financing is being arranged through Federal aid and bids will be asked soon on general contract.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SEE THE JOHANSSON DISPLAY AT THE CLEVELAND MACHINE TOOL SHOW. BOOTH A-201.

Air Reduction Sales Co., St. Louis, has purchased tract, 40 x 130 ft. on Plum Street for a three-story plant addition.

MIDDLE WEST

International Harvester Co., 606 South Michigan Boulevard, Chicago, has plans for additions to agricultural implement manufacturing plant at East Moline, Ill., including improvements in present units. Capacity will be more than doubled. Cost about $1,000,000 with machinery.

Columbia Metal Co., 1016 South California Avenue, Chicago, has let general contract to Rudenberg & Cohen, 1533 South Kedvale Avenue, for rebuilding part of three-story storage and distributing plant, 44 x 264 ft., recently damaged by fire. Cost over $30,000 with equipment. B. Albert Comm, 4722 North Kedzie Avenue, is architect.

Schmidt Brewing Co., 882 West Seventh Street, St. Paul, Minn., has plans for multi-story addition, 30 x 40 ft. Cost over $35,000 with elevating and other mechanical-handling equipment. W. W. Magee, 118 West Central Street, is architect.

Board of Directors, State Training School, Plankinton, S. D., plans extensions and improvements in steam power house at local school for central heating service, including new elevated steel tank for water system. Cost about $40,000. Financing is being arranged. Charles Trimmer, State House, Pierre, S. D., is State engineer.

Elco Tool & Screw Corpn., 1800 Broadway, Rockford, Ill., has let general contract to Linden & Sons, 432 London Street, for one-story addition. Cost about $25,000 with equipment. Peterson & Johnson, Swedish-American Bank Building, are architects.

Signal Corps Procurement District, 1819 West Pershing Road, Chicago, asks bids until Sept. 17 for galvanized yacht rigging rope, ⅜-in. diameter, galvanized guy thimbles for 5/16-in. wire rope, 51 antenna spreaders (Circular 12), fuses (Circular 11), flashlights (Circular 13).

Independent School District No. 24, Robbinsdale, Minn., plans manual training department in new two-story high school. Cost about $180,000 with equipment. Financing is being concluded through Federal aid. Haxby & Bissell, 1111 Nicolet Avenue, Minneapolis, Minn., are architects.

MICHIGAN DISTRICT

Wilcox-Rich Corpn., 9771 French Road, Detroit, manufacturer of piston rings, valves and other automobile equipment, has plans for one and two-story addition to plant at Saginaw, Mich., 90 x 210 ft. Cost over $75,000 with equipment. George S. Rider Co., Marshall Building, Cleveland, is architect and engineer; Cowles & Mutscheller, Saginaw, are associate architects. Company is a subsidiary of Eaton Mfg. Co., Cleveland.

Ainsworth Mfg. Corpn., 2200 Franklin Street, Detroit, manufacturer of metal stampings for automobiles and other automotive products, has awarded general contract to Bryant & Detwiler Co., Penobscot Building, for addition to plant, including new one-story power house. Cost close to $90,000 with equipment. Albert Kahn, Inc., New Center Building, is architect and engineer.

Chrysler Corpn., 341 Massachusetts Avenue, Detroit, has purchased former plant of Wills-St. Clair Motor Co., Marysville, Mich. Plant consists of several one-story units and will be used by purchasing company for expansion.

Detroit Steel Corpn., 1025 South Oakwood Street, Detroit, manufacturer of strip steel specialties, has awarded general contract to Barton Marlow Co., 1900 East Jefferson Street, for two one-story additions, 80 x 250 ft., and 80 x 120 ft. respectively. Cost over $75,000 with equipment.

Michigan Chemical Corpn., St. Louis, Mich., was erroneously referred to as Michigan Alkali & Chemical Corpn. in THE IRON AGE of Aug. 22, page 72. Michigan Chemical Corpn. plans to erect a two story and basement plant which, with equipment, will cost close to $150,000.

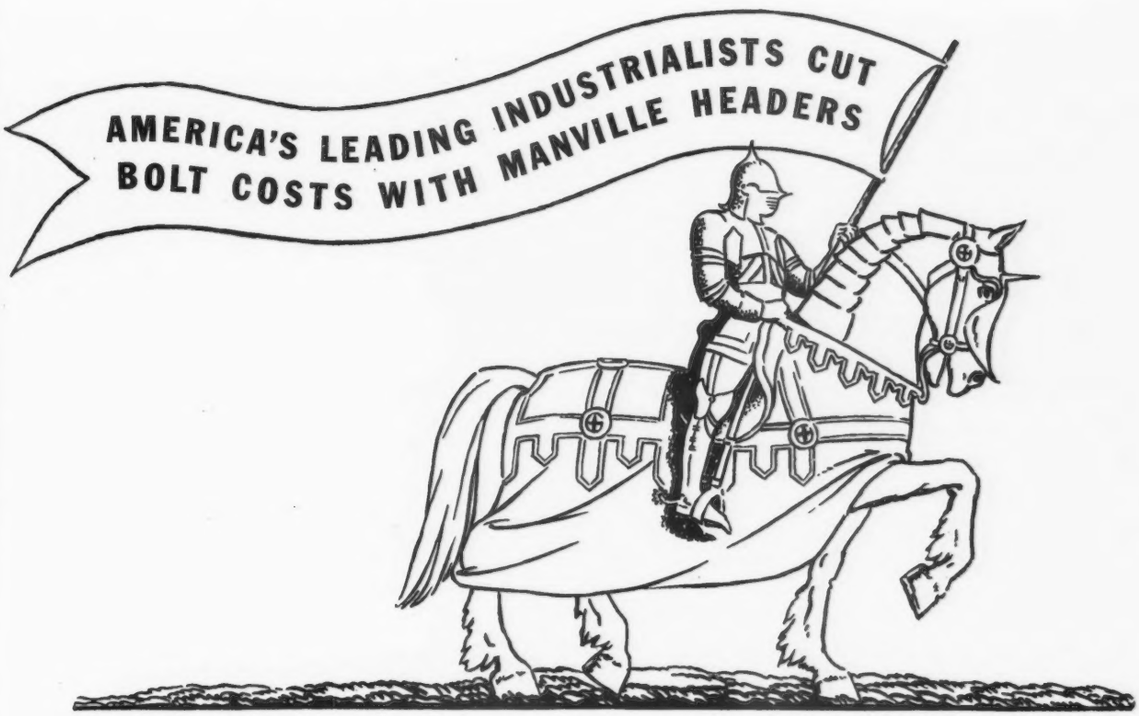
OHIO AND INDIANA

Wildermuth Brewery Co., Pomeroy, Ohio, will remodel local building, with installation of brew-house, mechanical bottling, tanks, vats and other equipment. Cost over $65,000. Konrad Keil, 1215 Windsor Drive, Dayton, Ohio, is engineer.

Board of Education, East Palestine, Ohio, plans manual training department in new three-story high school, for which bonds for $200,000 have been authorized. Financing is being arranged through Federal aid. Bids will be asked on general contract in fall.

Contracting Officer, Material Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until Sept. 9 for collimators and parts (Circular 97); until Sept. 10, 32 wing-type hydraulic jacks (Circular 152), engine bearer collars, exhaust caps, stack assemblies, trunnions, etc. (Circular 139); until Sept. 11, solenoid assemblies (Circular 142), pawls, pawl pins and pawl springs (Circular 140); until Sept. 12, one 5-ton power-operated roller (Circular 154).

Briggs Mfg. Co., 11631 Mack Avenue, Detroit, manufacturer of steel automobile bodies, has let general contract to Hoffman Construction Co., Union Building, Evansville, Ind., for one-story addition to branch plant at Evansville, 120 x470 ft., for production of bodies for Plymouth automobiles. Cost over $150,000 with equipment. Harry E. Boyle & Co., Inc.,



American Brass Company	Ansonia, Conn.
American Chain Company	Bridgeport, Conn.
General Electric Company	Bridgeport, Conn.
A. C. Gilbert Company	New Haven, Conn.
International Silver Company	Meriden, Conn.
Landers, Frary & Clark	New Britain, Conn.
New Departure Mfg. Company	Bristol, Conn.
Republic Steel Company	Unionville, Conn.
Sargent & Company	New Haven, Conn.
Scovill Mfg. Company	Waterbury, Conn.
Singer Manufacturing Company	Bridgeport, Conn.
S K F Ball Bearing Company	Hartford, Conn.
Stanley Rule & Level Company	New Britain, Conn.
Steel & Johnson Mfg. Company	Waterbury, Conn.
Underwood Elliott Fisher Co.	Bridgeport, Conn.
Waterbury Buckle Company	Waterbury, Conn.
Waterbury Clock Company	Waterbury, Conn.
Winchester Repeating Arms Co.	New Haven, Conn.
Yale & Towne Mfg. Company	Stamford, Conn.
American Car & Foundry Co.	Chicago, Ill.
American Steel & Wire Company	Waukegan, Ill.
Calumet Steel Company	Chicago Hts., Ill.
Champion Mfg. Company	Chicago, Ill.
Crane Company	Chicago, Ill.
Illinois Watch Case Company	Elgin, Ill.
International Harvester Company	Chicago, Ill.
Stewart Warner Company	Chicago, Ill.
Delco-Remy Corporation	Anderson, Ind.
B. & O. R. R.	Baltimore, Md.
Warren Telechron Company	Ashland, Mass.
A. C. Spark Plug Company	Flint, Mich.
Budd Wheel Company	Detroit, Mich.
Burroughs Adding Machine Co.	Detroit, Mich.
Chevrolet Motor Company	Flint, Mich.
Dodge Bros. Company	Detroit, Mich.
Ford Motor Company	Detroit, Mich.
Sheffield Steel Corp.	Kansas City, Mo.
Michelin Tire Company	Milltown, N. J.
R. C. A. Victor Company	Camden, N. J.
Westinghouse Lamp Company	Belleville, N. J.
American Safety Razor Corp.	Brooklyn, N. Y.
Amtorg Trading Corp.	New York City
Remington Typewriter Company	Ilion, N. Y.
Savage Arms Corp.	Utica, N. Y.
Timken Roller Bearing Company	Canton, Ohio
Champion Spark Plug Company	Toledo, Ohio
Delco Products Corp.	Dayton, Ohio
Firestone Steel Products Company	Akron, Ohio
Frigidaire Corp.	Dayton, Ohio
General Fireproofing Company	Youngstown, Ohio
Thompson Products Company	Cleveland, Ohio
Atwater Kent Mfg. Company	Philadelphia, Pa.
Bethlehem Steel Corp.	Lebanon, Pa.
Edw. G. Budd Mfg. Company	Philadelphia, Pa.
Duplan Silk Corp.	Hazleton, Pa.
Hamilton Watch Company	Lancaster, Pa.
Penna. R. R. Company	Altoona, Pa.
U. S. Aluminum Company	New Kensington, Pa.
Simmons Company	Kenosha, Wis.
A. O. Smith Corp.	Milwaukee, Wis.

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MANVILLE HEADERS

E. J. MANVILLE MACHINE CO. WATERBURY, CONN.

Furniture Building, Evansville, is architect.

Lieber Brewing Co., 1254 South West Street, Indianapolis, plans three-story and basement addition, including improvements in present plant. Cost close to $160,000 with equipment. Vonnegut, Bohn & Mueller, Indiana Trust Building, are architects and engineers.

WASHINGTON DIST.

Purchasing and Contracting Officer, Holabird Quartermaster Depot, Baltimore, asks bids until Sept. 20 for one foam generator (Circular 24); until Sept. 23, one air compressor and one motor starting switch (Circular 36).

Sanitary Grocery Co., Inc., Richmond, Va., plans one and two-story bulk storage and distributing building, to include refrigerating plant and system. Cost about $100,000 with mechanical-handling and other equipment.

Board of District Commissioners, District Building, Washington, asks bids until Sept. 9 for two crawler track type tractors with bulldozer; until Sept. 16, traffic signal devices and equipment, including control apparatus, etc.

General Purchasing Officer, Panama Canal, Washington, asks bids until Sept. 12 for 100,000 ft. copper wire, 23,000 ft. cable, 2000 lb. steel wire, floodlighting projectors, switches, oil circuit breakers, one electric valve refacer, one electric valve lapper and other equipment (Schedule 3086).

Roanoke County Board of Education, Roanoke, Va., plans manual training department in new two-story high school in Buck Creek district. Cost about $150,000. Financing is being arranged through Federal aid. Smithey & Boynton, 112 Kirk Avenue, West, Roanoke, are architects.

Purchasing Officer, Department of Interior, Washington, asks bids until Sept. 9 for tractors, tractors with trailers and tractors of solid fuel injection type (Proposal 921).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Sept. 13 for electric blowers (Schedule 5848), parts for aircraft engines (Schedule 900-8737); until Sept. 17, casting, cleaning and platers' brushes (Schedule 5894) for Eastern and Western navy yards.

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SOUTH CENTRAL

Director of Purchases, Tennessee Valley Authority, Knoxville, Tenn., asks bids until Sept. 11 for one electric crane for Pickwick Landing project.

Penick & Ford, Ltd., New Orleans, manufacturer of food products, has approved plans for addition, 50 x 75 ft., to power plant at factory at Harvey, La., including improvements in present station. Cost over $45,000 with equipment.

Dowling Brothers, Inc., Burgin, Ky., has work under way on new distillery, to include several one-story units. Cost over $75,000 with machinery.

Shoreline Refining Co., Shreveport, La., plans extensions and improvements in oil refinery near Oil City, La., including equipment. A one-story oil-canning plant will also be erected, with capacity of about 40,000 quart and pint can units per day. Cost close to $75,000 with machinery.

United States Engineer Office, Vicksburg, Miss., asks bids until Sept. 9 for globe, angle and gate valves (Circular 45); until Sept. 11, one steam engine-driven, marine type, electric generating set (Circular 44).

Brown & Williamson Tobacco Corpn., 1600 West Hill Street, Louisville, has filed plans for one-story addition for storage and distribution. Cost about $90,000 with mechanical-handling equipment.

Department of Education, Chattanooga, Tenn., has secured bond issue of $105,800 for new vocational training school, and will ask bids soon on general contract. Martin & Franklin, Chattanooga, are architects.

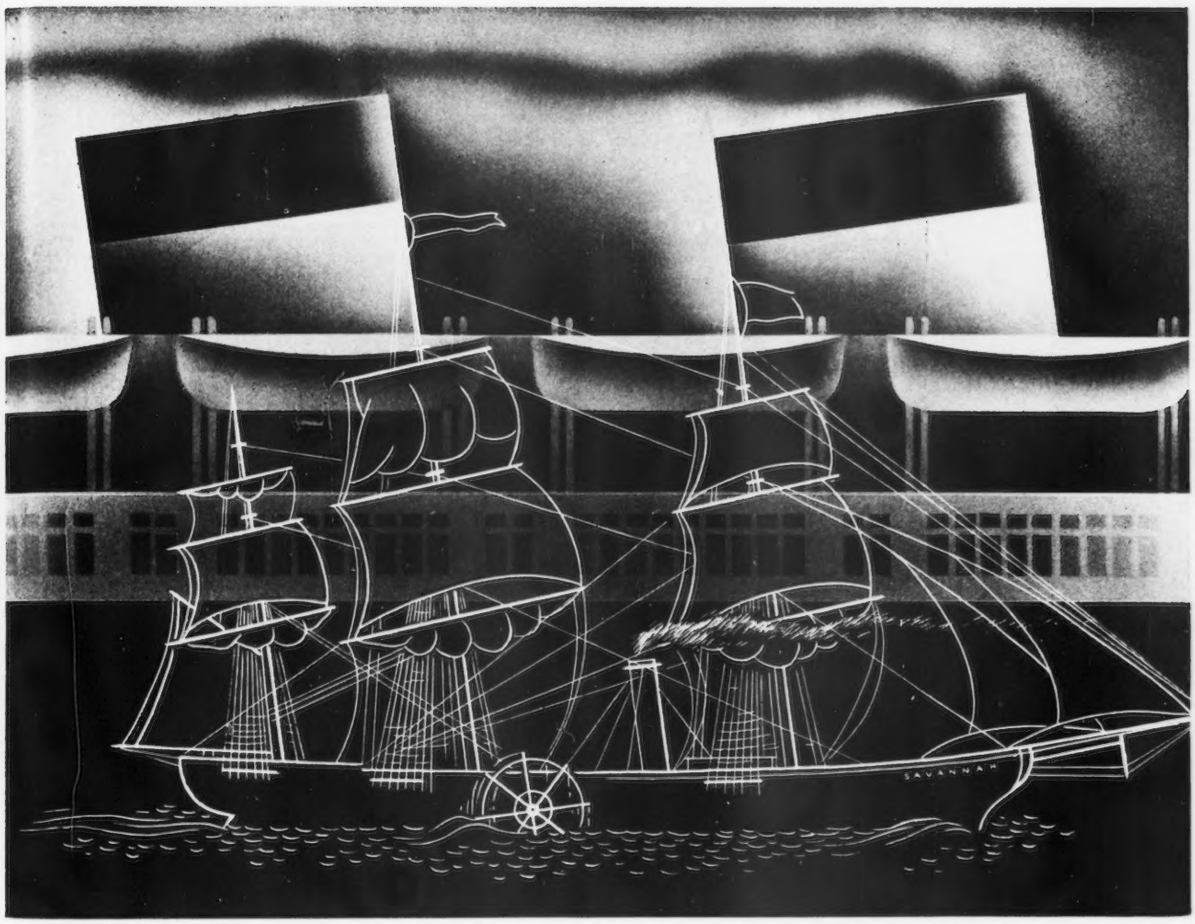
PACIFIC COAST

Earl Fruit Co., Delano, Cal., has let general contract to Cahill Brothers, 206 Sansome Street, San Francisco, for new winery. Cost about $65,000 with equipment.

H. M. Crumbaugh, 530 West Jefferson Street, Phoenix, Ariz., is at head of project to erect local plant, with power house, for manufacture of dry ice. Cost close to $100,000 with machinery. Company will be organized to carry out project.

Zellerbach Paper Co., 220 South Los Angeles Street, Los Angeles, has let general contract to Austin Co. of California for new one-story paper-converting, storage and distributing plant, 182 x 940 ft. Cost close to $300,000 with equipment. Ralph Beebee, 1976 San Pablo Avenue, Berkeley, Cal., and Leland S. Rosener, 233 Sansome Street, San Francisco, are engineers.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Sept. 10 for one motor-driven bench lathe and spare parts (Schedule 5854), one miller, with bench, motor, attachments and spare parts (Schedule 5855), one motor-driven watchmaker's lathe and spare parts (Schedule 5853) for San Pedro, Cal., Naval Station; spare parts for storage batteries (Schedule 5829); until Sept. 13, one motor-driven combination shear, punch, coper and notcher (Schedule 5864), one motor-driven engraving machine and bench-type cutter grinder (Schedule 5861), one sheet metal-working brake (Schedule 5865); until Sept. 17, 36



Marvel of her era . . . outclassed today

WHEN the Savannah made her epic crossing of the Atlantic, she was hailed as the ultimate in steam-powered vessels. Yet such succeeding queens of the sea as the Great Eastern, the St. Louis and the Deutschland reigned under the similar popular belief that the limits of size, speed, luxury and safety in ocean liners had finally been reached. Today, even while the magnificent Normandie is ushering in another epoch in ocean transportation her alert owners are giving heed to the needs and problems the future may bring.

Steamship history has many parallels. Take steel. Since the basic discoveries of Kelly and Bessemer, steel progress has been restless with change . . . less visible, perhaps, than is possible with steamships, or skyscrapers, but gradual and pronounced nevertheless. The use of element after element has been developed to improve steel's qualities or to endow it with new properties for different purposes.

Many of such alloyed steels of the past two decades have come to be regarded as "satisfactory" for the uses they serve . . . mainly because engineers, superintendents and shop foremen have become accustomed to their characteristics. Yet change — progress — is still on the march. No advance of the past decade has been more significant than that afforded by Molybdenum. Widely proved during many years and in thousands of laboratory tests, and foundry, shop and service applications, this really unique alloying element has been found capable not only of improving practically all of steel's generally desired properties, but of enabling other alloys better to serve their particular purposes.

To engineers, metallurgists and production executives we offer these interesting books: "Molybdenum in 1934" and "Molybdenum in Cast Iron — 1934 Supplement." Also ask us to mail you our periodical news-sheet, "The Moly Matrix." Be free, too, to enlist our Detroit experimental laboratory's help at any time. Climax Molybdenum Co., 500 Fifth Ave., New York.

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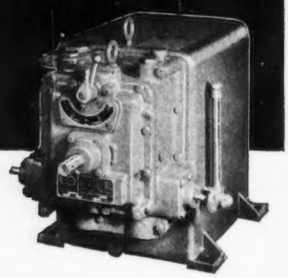

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OILGEAR FLUID POWER FEEDS

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hand pumps (Schedule 5893), one motor-driven hacksaw (Schedule 5892), 30,000 ft. water hose with couplings (Schedule 5881), aluminum chairs (Schedule 5889) for Mare Island Navy Yard.

Coca Cola Co., Sacramento, Cal., has plans for one-story mechanical bottling works. Cost over $45,000 with equipment. Charles F. Dean, California Life Building, is architect.

Vacuum Wine & Spirits Canning Corpn., Elk Grove, near Sacramento, Cal., recently organized with capital of $250,000 by interests identified with Elk Grove Winery, Inc., with which company will be affiliated, has plans for new winery near Elk Grove, with storage and distributing buildings, power house, etc. Cost close to $100,000 with equipment. George Wurster and C. F. Hansen are heads.

◀ FOREIGN ▶

Westland Aircraft, Ltd., Yeovil, England, manufacturer of airplanes and parts, plans expansion and improvements, comprising group of shop units for parts production and assembling. Cost over $600,000 with equipment.

Petromex, Ltd., Mexico, D. F., operating oil refineries and properties at Tampico, Mexico, plans new refinery on site near Mexico City, comprising several units with large steel tank capacity for storage and distribution. Cost over $600,000 with machinery. Pascual Ortiz Rubio, former president of Mexico, heads company.

Courtaulds, Ltd., London, England, manufacturer of cellulose rayon products, will soon begin superstructure for addition to mill at Preston, England, consisting of several one and multi-story units. Cost in excess of $2,500,000 with equipment.

Victoria Falls & Transvaal Power Co., Ltd., Klip, South Africa, plans new hydro-electric generating plant near Livingston, South Africa, including transmission system, substations and switching stations, and other structures for connection with present lines. Cost close to $1,200,000. Merz & McLellan, London, England, are consulting engineers.

Bontoc Exploration Co., Insular Life Building, Philippine Islands, is in the market for furnaces for manufacture of iron and steel from iron ores. Quotations on furnaces of 100 to 200 tons capacity, "using coal or electricity," are solicited.

Trade Notes

Herberts Machinery Co., Ltd., Los Angeles, has established a special export department at 50 Church Street, New York, to handle foreign orders for Wood-Wizard power tools, Wood-Wizard junior tools and Wizard machines.

Read Machinery Co., Inc., York, Pa., has appointed J. R. Stewart, 17511 Pennington Drive, Detroit, as representative of Readco mixing equipment in all industries except the bakery and food in the lower peninsula of Michigan.

Taunton-New Bedford Division, Revere Copper & Brass, Inc., has been removed from Taunton to New Bedford, Mass., where Revere's principal New England mill is located. Mill operations will be continued in Taunton, and a warehouse will also be maintained there.

Robert Breuer has purchased entire operating business of C. R. Breuer Smelting & Refining Co. and has taken over all equipment, accounts receivable, and other working assets as well as current liabilities outstanding at June 1, 1935. Business will be continued as usual, but under the name of "C. R. Breuer & Co."

Republic Steel Corpn. announces the opening of a new sales office at 622 Dwight Bldg., Kansas City, Mo., effective Sept. 1. The new office will be in charge of Robert L. Pierce, of the St. Louis district sales office. The telephone number of the new office will be Harrison 0925.

Automatic Safety Clutch Co., Inc., is the new name of the reorganized G. O. B. Engineering Co. The company manufactures safety overload clutches and its address is 608 South Dearborn St., Chicago.

McQuay-Norris Mfg. Co., piston rings, St. Louis, report net earnings of $267,677, equal to $2.34 a share for the first six months of 1935, compared with $200,511, equal to $1.75 a share for the first half of 1934.

Wilson Welder & Metals Co. announces the appointment of A. M. Castle & Co. as exclusive distributers of Wilson shielded arc electrodes in the Chicago territory, including the States of Iowa, Wisconsin, northern Illinois, northern Indiana and western Michigan.

A. M. Castle & Co. will also distribute Wilson shielded arc electrodes on a non-exclusive basis in the Pacific Coast States of Washington, Oregon and California.

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● The modern gas range is *better because it's welded!* Welding makes a sturdier stove at less cost, eliminates chipping of enamel and insures lasting beauty—features that are inherent in jointless design and construction by welding.

Welding has made many good products better — stoves, automobiles, airplanes, radios, streamlined locomotives, metal furniture, and a thousand other things. You, too, may find it profitable to consider the advantages in both production and sales which can be gained for your products by jointless design-for-welding.

Linde engineers will gladly cooperate with you in the design or redesign of your products for welding. The benefit of their broad experience is available from Linde Sales Offices located in thirty principal cities throughout the country and at 30 East 42nd Street, New York, N. Y.

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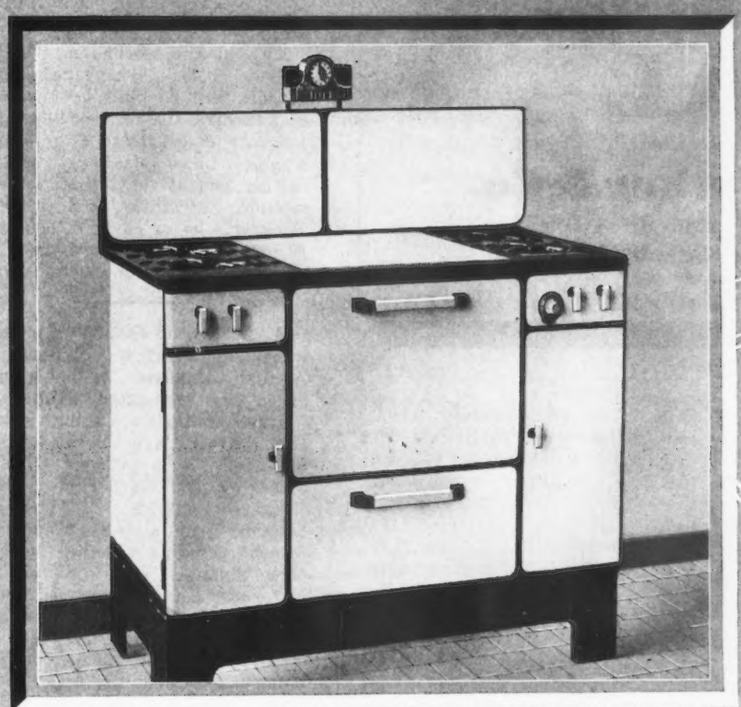

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British Look for More Canadian Business

TORONTO, ONT.—Official announcement is made from London, England, to the effect that H. M. Long, Ltd., of Montreal, Que., has been appointed Canadian representative of the British Steel Export Association, which is the export selling organization for the heavy steel trade of Great Britain, comprising 13 manufacturing firms. This announcement follows closely the return to Britain of a delegation which visited Canada, and which for three months studied conditions in this country in relation to the use of heavy steel. The appointment of H. M. Long, Ltd., forms part of the new arrangement being made by the British heavy steel trade in an effort to obtain more business in the Canadian market.

It is expected that when the plans made by the delegation become completely effective, British exports of steel products to this market, which now are decreasing, should rise substantially despite outside competition. With a knowledge of the requirements of the Canadian markets gained by the visiting delegation special pains will be taken to adapt British standards, qualities and services to Canadian requirements. New efforts on the part of the British steel industry are being inspired by Sir Andrew Duncan, author of the Duncan Report, and also chairman of several commissions appointed by the Canadian government. Sir Andrew is now chairman of the Federation of British Iron and Steel Industries, having been appointed by the makers themselves to consolidate and strengthen their position at home and abroad.

Ludlum Adds to Alloy Wire Capacity

THE Ludlum Steel Co., Dunkirk, N. Y., has approved plans for a new one-story addition to its local mill, to be equipped for manufacture of alloy steel wire products, more than tripling capacity of present wire mill. Installation will include an electric furnace. Company will also make improvements in metal division at local plant, including installation of an electric furnace unit and auxiliary equipment. Cost over $50,000. Headquarters are at Watervliet, N. Y.

Two of the world's largest hydrogen-cooled synchronous condensers will be built by the General Electric Co. for the Bureau of Power & Light, City of Los Angeles, to be installed on the receiving end of the 270-mile transmission line from Boulder Dam. They will be rated at 60,000 kva., 13,800 volts, 60 cycles, and will be installed outdoors.

A display of the new grinding wheels made from genuine South African diamonds is being prepared for the third annual industrial materials exhibit at the Hotel Astor, New York, October 21 to 25. The display will be sponsored by the Carborundum Co., Niagara Falls, N. Y. The new diamond grinding wheels are used for the grinding of cemented carbide, which is one of the hardest materials employed by industry. The exhibit will also contain a revolving crystal mass of carborundum just as it comes from the electric furnaces, and colored transparencies of spectacular grinding operations.

The increasing use of

PARKER PROCESSES *on* HOUSEHOLD EQUIPMENT

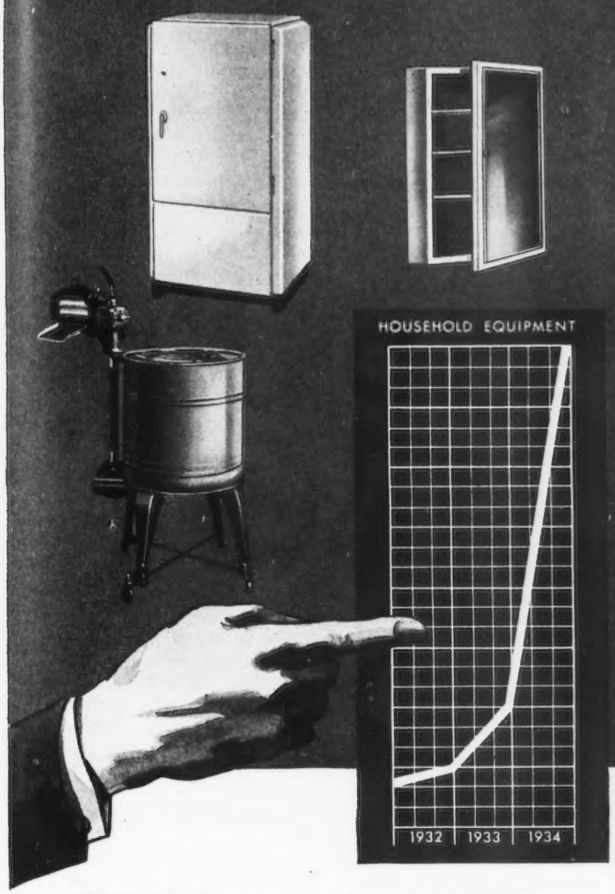


Chart shows the increasing use of Bonderizing on household equipment for the past three years, according to a scale based on units of rust proofing energy.

EVERY YEAR sees increased use of Parker Processes on refrigerators, washing machines, bathroom cabinets and other household units of similar character that require better than ordinary finishing methods to prevent rust.

Bonderizing (a Parker Process) under the paint, enamel or lacquer, provides a rust resistant, cohesive base that holds the final finish and prevents cracking and peeling. It stops the spread of rust around accidental scratch or dent.

Bonderizing is an extra quality feature that adds tremendously to the life and usefulness of the painted product. It assures better appearance for a longer period and eliminates complaints and reconditioning costs. It is an added selling point for the retailer that he can use to great advantage and creates new prestige for the manufacturer.

Any producer of iron or steel household equipment that will be exposed to the humid atmosphere of kitchen, bathroom or damp basement, should investigate the value of Bonderizing.

PARKER RUST-PROOF COMPANY • 2186 E. Milwaukee Ave., Detroit, Michigan

The Parker Processes are the result of more than 20 years of research in scientific metal protection. Literature describing these processes will be sent, upon request, to interested manufacturers and technical men.

PARKER RUST-PROOFING *processes*

BONDERIZING • PARKERIZING

ALSO Mead Morrison Hoists and Buckets and Robins Belt Conveyors, Bin Gates, Screens and other products.

Announcing the

NEW **ROBINS**

portable conveyor

The Style F has everything! Lightness with strength, reasonable price, anti-friction bearings throughout including the top belt rollers. Send for further information.

I would be pleased to have as checked: Representative Call ( ) Mead Morrison Literature ( ) Pictures and Description of Robins Style F Portable Conveyors ( ).

Name .....

Firm .....

Address .....

MATERIAL HANDLING ROBINS EQUIPMENT

Robins Conveying Belt Co.
15 Park Row, New York City
Branches in Principal Cities

Send for descriptive literature

British Steel Demand Improving — Sweden Considering Tin Mills

LONDON, Sept. 4.—(*By Cable*)—The British iron and steel market is reviving very slowly after the holidays. Some additional pig iron has accumulated but deliveries are being maintained at a high level, and stocks, which are still low, are likely to resume a downward trend in the near future. Autumn will likely see more furnaces blown in. Italy is interested but sales are made difficult by financial obstacles.

British semi-finished and finished steel mills are busy, especially because imports from the Continent are restricted under quota arrangements. Structural steel is in good demand. Business in shipbuilding material is still disappointing though hopes are held that reconstruction of the British navy probably will soon provide big demand. The Continental steel market is fairly active. August bookings were well maintained and better demand from Holland, Scandinavia, the Near East and South America is partially offsetting quiet British business. More business could be had if financial difficulties could be surmounted as inquiries are numerous. The German home market is still active.

Tin plate is featureless with fair business coming in. It is reported that Sweden is contemplating erecting tin plate mills at Lysekil about 45 miles north of Gothenburg.

Russia is featuring more prominently as an iron and steel supplier and has made trial shipments of 800 tons of pig iron to Sweden and 2000 tons of rails to Esthonia. It is suggested here that Russia will eventually join the steel cartel.

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton

Ferromanganese, export	£9
Billets, open-hearth	£5 10s. to £5 15s.
Tin plate, per base box	*18s. 2d. to 18s. 7½d.*
Steel bars, open-hearth	£7 17½s.
Beams, open-hearth	£7 7½s.
Channels, open-hearth	£7 12½s.
Angles, open-hearth	£7 7½s.
Black sheets, No. 24 gage	£9 5s.
Galvanized sheets, No. 24 gage	£11 5s.

*To Nov. 1; 18s. 5d. to 18s. 10½d. thereafter.

Official Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £

Current dollar equivalent is ascertained by multiplying gold pound price by 124.14 to obtain franc equivalent and then converting at present rate of dollar-franc exchange.

Billets, Thomas	£2 7s.
Wire rods, No. 5 B.W.G.	£4 10s.
Steel Bars, merchant	£3 5s.
Sheet bars	£2 8s.
Plate, ¼ in. and up	£4 2s. 6d.
Plate, 3/16 in. and 5 mm.	£4 4s. 8d.
Sheets, ⅛ in.	£4 9s. 8d.
Beams, Thomas	£3 2s. 6d.
Angles (Basic)	£3 2s. 6d.
Hoops and strip base	£4 2s. 6d.
Wire, plain, No. 8	£5 7s. 6d.
Wire nails	£5 15s.
Wire, barbed, 4 pt. No. 10 B.W.G.	£8 15s.

Aetna-Standard Books Equipment Order

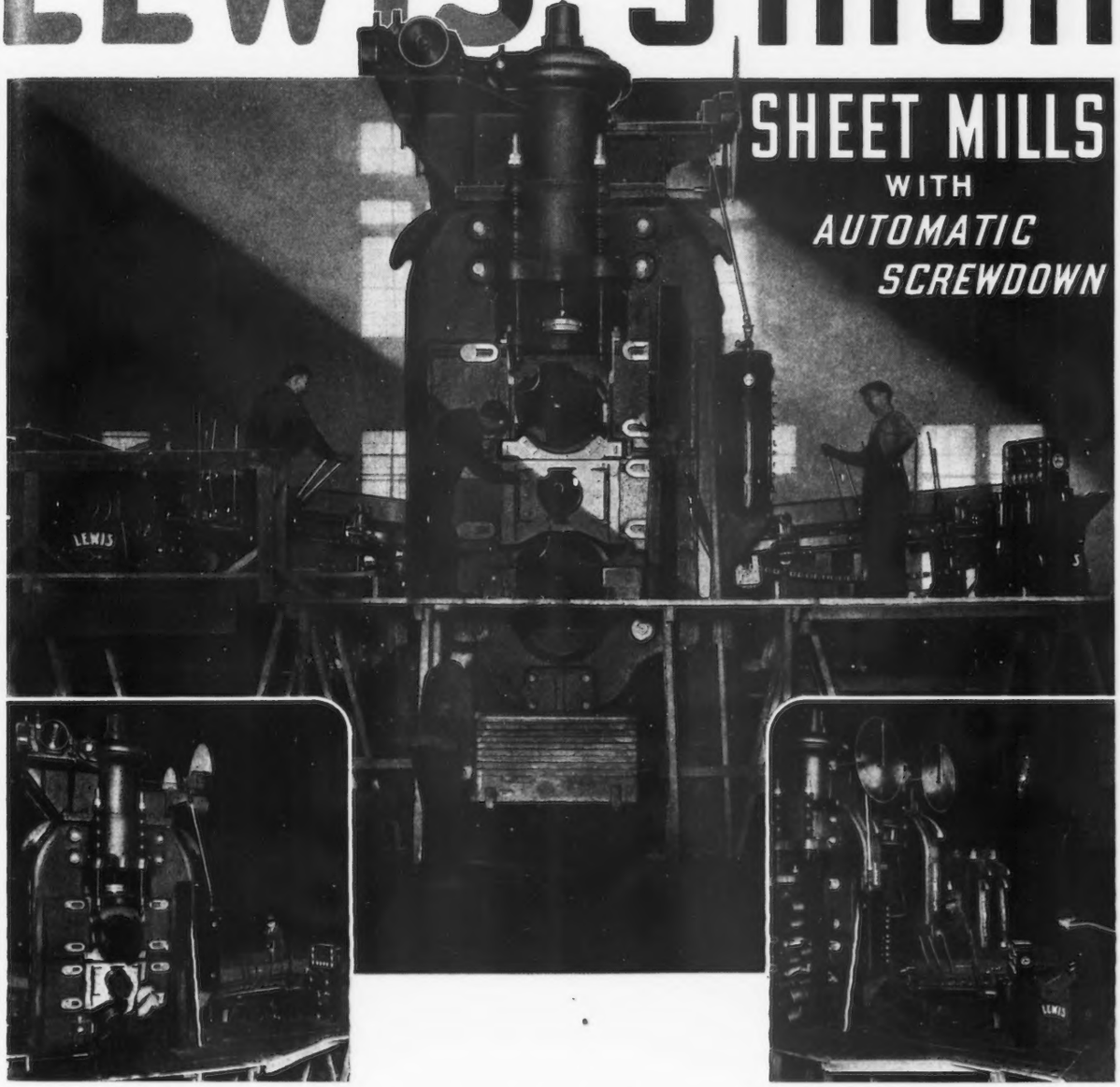
THE Aetna-Standard Engineering Co., Youngstown, has received orders for approximately $50,000 worth of machinery for the new wide strip mill being erected at Lackawanna, N. Y., by the Bethlehem Steel Co. The Aetna-Standard company has also received similar orders for a number of the other wide strip mills now under construction and has booked considerable equipment for shipment to Russia.

Wrecking operations have been begun on 44 plant buildings of the Studebaker Corpn. at South Bend, Ind., from which about 5000 tons of structural steel and pipe will be recovered. In addition to these structures is a forge building, from which approximately 3000 tons of structural steel and steel sash will be obtained. The forge building also has nine overhead cranes. The demolition work is being done by the Woodmere Scrap Iron & Metal Co., 9101 West Fort Street, Detroit, which purchased the buildings for dismantling.

The Concrete Reinforcing Steel Fabricating Industry of Northern California has introduced a depository for the purpose of filing bids. Bids on the steel requirements in all general contracts will be deposited with R. D. Cortelyou, managing director, who will open them after bids on the general contract have been opened. Headquarters are at Room 218, Chronicle Building, San Francisco.

LEWIS 3 HIGH

SHEET MILLS WITH *AUTOMATIC SCREWDOWN*



Here is illustrated a LEWIS Three High Sheet Mill with automatic screwdown, completely erected for a very thorough shop test before shipment.

LEWIS Three High Sheet Mills are featured for—

- **Automatic screwdown when specified.**
- **Accuracy.**
- **Simplicity.**
- **Independent control of screwdown and feeder and catcher tables.**
- **Increased production.**
- **Long life.**
- **Increased tonnage from rolls.**
- **Better finish of finished work.**

The Three High Tables are roller bearing equipped throughout. All gears and moving parts are wholly enclosed and run in oil.

An engineer will gladly call and show you the many detailed advantages of Lewis Three High Sheet Mill Equipment.

LEWIS

LEWIS FOUNDRY & MACHINE CO.

PITTSBURGH, PA.

READY
for the RACE

Ample stocks in precision and commercial grades of steel bearing balls await only your order to speed them on the way for your final assembly in the races.

The ABBOTT BALL Co.
1047 New Britain Avenue
Hartford, Connecticut

ABBOTT BEARING BALLS

NEW TRADE PUBLICATIONS

Structural Bolts.—Automatic Nut Co., Chrysler Building, New York. Folder. Gives full data in connection with use of structural rib bolts and Anco nuts as a practical substitute for riveting in specified applications.

Wire Cloth.—Audubon Wire Cloth Corpn. Philadelphia. Catalog, No. 40. Lists and illustrates complete line of products and presents several pages of useful information as to product uses. Includes "Metalwove" belting and apron applications for conveyors. The catalog is published in 56, 16 and 8-page editions; No. 40 contains information on the full line, No. 41 covers flexible wire cloth only, and No. 42 contains everything except specifications, lists and tables of information.

Materials Handling.—Lewis-Shepard Co., Watertown Station, Boston. Circular. Pictures and gives short descriptions of platforms, storage equipments and lift-trucks as manufactured by the company for use in its system of materials handling.

Fire Extinguisher.—Garrison Engineering Corpn., Waterbury, Conn. Folder presenting particulars of a new industrial fire extinguisher, "Garfire," employing the Garrison Dugas dry compound.

Steam Traps. — Yarnall-Waring Co., Chestnut Hill, Philadelphia. Folder. Illustrates, describes and gives specifications of new "Yarway" impulse steam traps in six sizes from ½ in. up to 2 in. for working pressures up to 400 lb.

Couplings.—John Waldron Corpn., New Brunswick, N. J. Catalog. Describes changes in design and materials employed in the Francke flexible coupling manufactured and distributed by the company. Directions for size selections and coupling service factors. Sizes are listed for various types.

Industrial Locomotives.—Brookville Locomotive Co., Brookville, Pa. Descriptions, specifications and sectional views showing installation of Ford V-8 motors and power hook-up in industrial locomotives manufactured by the company in capacity ratings from 2½ to 6 tons.

Anti-Friction Bearings.—The Gwilliam Co., 360 Furman Street, Brooklyn, N. Y. Catalog No. 12. Describes lines of ball and roller bearings and contains illustrations of various types.

Floor Stands.—Andrew C. Campbell Division, American Chain Co., Bridgeport, Conn. Folder giving specifications of Campbell bar-type floor stands for use with the company's abrasive cut-off machines or with other equipment requiring bar or tubing support.

Electrode Holder. — Metalweld, Inc., Twenty-sixth Street and Hunting Park Avenue, Philadelphia. Folder picturizing and describing a new Metalweld electrode holder and clamps, Navy-type.

Sidewalk Doors.—J. William Lovatt, 937 East Twenty-sixth Street, Paterson, N. J. Bulletin describing and outlining installation of a new "Lev-l-lok" locking device for types of horizontal doors and closures which should not have protruding elements but which require locking.

Blowers.—Emerson Electric Mfg. Co., St. Louis, Mo. Catalog. Eight pages describing, illustrating and giving specifications of furnace blowers, air washers, filter housings, furnace fans and bonnet controls.

Blast Cleaners, airless. — Pangborn Corpn., Hagerstown, Md. Bulletin. Describes and illustrates "Rotoblast" method of materials cleaning without the use of compressed air as the abrasive driving agent.

Drifters.—Chicago Pneumatic Tool Co., 6 East Forty-fourth Street, New York. Sectionally illustrates three models of a new line of drifters specified as suitable for every drifting need.

Conveyors. — Palmer-Bee Co., Detroit. Catalog, 64 pages, section 107 of general catalog No. 100. Describes, illustrates, gives outlines and tables of useful information concerning conveyor machinery of screw or spiral type.

Screw Anchors.—Rawlplug Co., Inc., 98 Lafayette Street, New York. Booklet. Gives full data on construction and use of wood screw anchors. Illustrates use in concrete, plaster, metals and compositions.

Belt Lacers.—Clipper Belt Lacer Co., Grand Rapids, Mich. Folder. Operations involved in the use of "Clipper" equipment fully described and illustrated. Methods of applying and removing Clipper carded hooks, together with hook sizes are specified.

Thermometers.—C. J. Tagliabue Mfg. Co., Park and Nostrand Avenues, Brooklyn, N. Y. Catalog, 24 pages. Descriptions include miscellaneous metal and woodback thermometers and also hygrometers, U-gages, mercurial vacuum gages and mercurial barometers. Illustrations of various types. Specifications, drawings and tables.

Grinders.—Landis Tool Co., Waynesboro, Pa. Catalog, plain hydraulic grinders in 10, 14 and 16 in. sizes. Set-ups illustrated. Complete specifications and detailed text description.

Couplings.—Smith & Serrell, Newark, N. J. Bulletin covering "Flexpin" method of providing against shaft misalinement while gaining a cushioned effect against vibration and shock. Illustrates improvements and directional flexibility. Tables of bores and keyway sizes. Rated up to 4200 hp., and 13¼ in. diameters.

Return Units.—Decatur Pump Co., Decatur, Ill. Bulletin descriptive of a new small-capacity Burks condensation return unit.

Starters.—Allen-Bradley Co., Milwaukee. Color bulletin illustrating the various switch mechanisms for automatic starters manufactured by the Allen Bradley Co.

Spot Welders.—Pier Equipment Mfg. Co., Benton Harbor, Mich. Bulletin describing "Ace" spot welders in both floor and bench types for production and general work. Light and medium models shown.

Drop Hammers. — Chambersburg Engineering Co., Chambersburg, Pa. Bulletin E, steam drop hammers in rated size pounds from 1000 to 16,000. Descriptions of hammers and units. Information and comparative illustrations concerning the alloy, "Cecolloy," employed in the building of these model E equipments.

Couplings. — Crocker-Wheeler Electric Mfg. Co., Ampere, N. J. Bulletin on resilient flexible couplings utilizing a series of rubber balls in a circle of corrugations completely inclosed within a highly finished housing. Describes the method of noise and vibration elimination and illustrates design permitting the non-use of lubricant.

Tools.—Bonney Forge & Tool Works, Allentown, Pa. Catalog, 47 pages. Contains illustrations, descriptions and numerical price list of all lines and sets of wrenches, standard and special, screw drivers, punches, chisels, stillson wrenches and pliers as manufactured by this company.

For Joints Subject to Expansion and Contraction

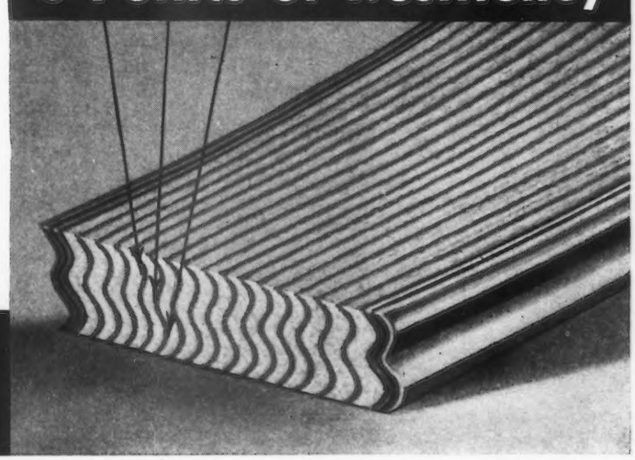
GARLOCK GUARDIAN GASKETS

Resilient, rugged and reliable—Garlock Guardian Gaskets give excellent service on boilers, pipe lines and other equipment which expands and contracts with changing temperatures. Resiliency is not destroyed by repeated expansion and contraction. The easy compression and instantaneous rebound also keep joints tight in equipment that vibrates. Let Garlock Guardian Gaskets help you stop power waste in your plant!

THE GARLOCK PACKING COMPANY
PALMYRA, NEW YORK

In Canada:
The Garlock Packing Company of Canada, Ltd.,
Montreal, Que.

3 Points of Resiliency



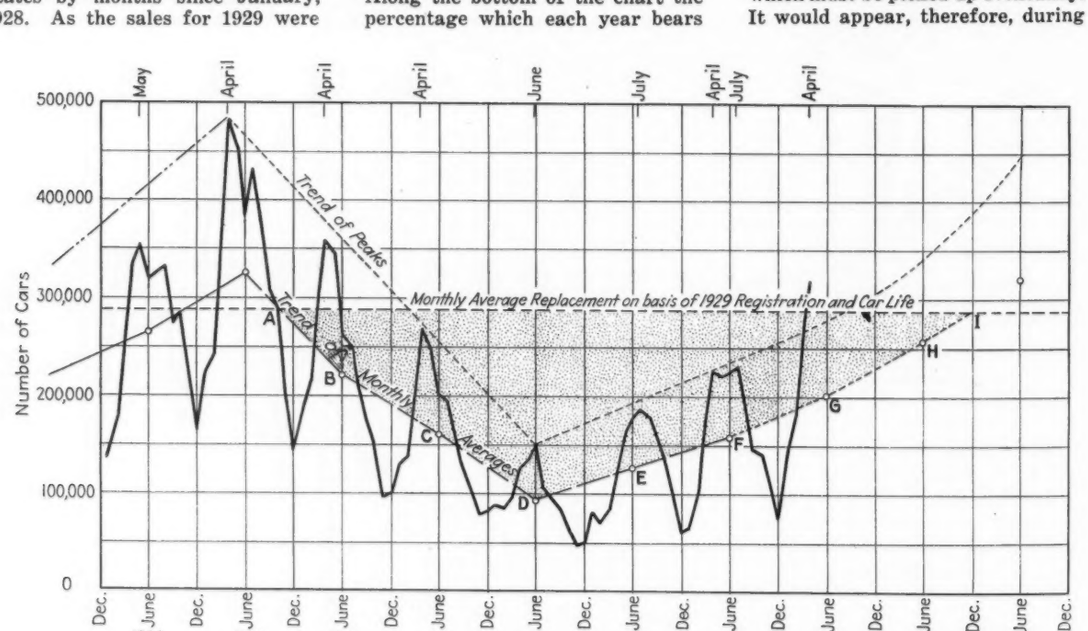
This cross-section view of a Garlock Guardian Gasket shows the three points of resiliency provided by the unique construction of the metal strips which alternate with layers of asbestos.

Deferred Replacements of Automobiles Are Huge

THIS chart has been built up by plotting the registration of new passenger car sales in the United States by months since January, 1928. As the sales for 1929 were the largest in the history of the industry, the sales volume that year is assumed to be 100 per cent. Along the bottom of the chart the percentage which each year bears to the 1929 figure is indicated. The total sales, and the percentage which they bear to 1929, have been projected for 1935, 1936 and 1937.

From 1929 to 1932 the trend of peak sales has a close relationship to a straight line. The same is true for the years 1932, 1933 and 1934. This trend has been projected upward through 1937 with provision for acceleration of production resulting from further improvement in business conditions. The average monthly sales have been plotted in June for each year and projected for 1935, 1936 and 1937.

The number of passenger cars licensed in the United States in 1929 was 23,121,589. If this figure is divided by the 6.75-year life of cars, it would require an annual replacement of 3,425,420, or an average monthly sale of 285,452 cars, to maintain this registration figure. A line representing this latter figure has been plotted horizontally across the diagram, intersecting the downward trend of the actual average monthly sales toward the end of 1929. On the basis of the projection of monthly averages through 1935, 1936 and 1937, it would recross this 1929 monthly replacement line about the end of 1936. The area between the horizontal monthly replacement line of 1929 and the trend of monthly averages each year represents the accumulation of deferred replacement which must be picked up eventually. It would appear, therefore, during

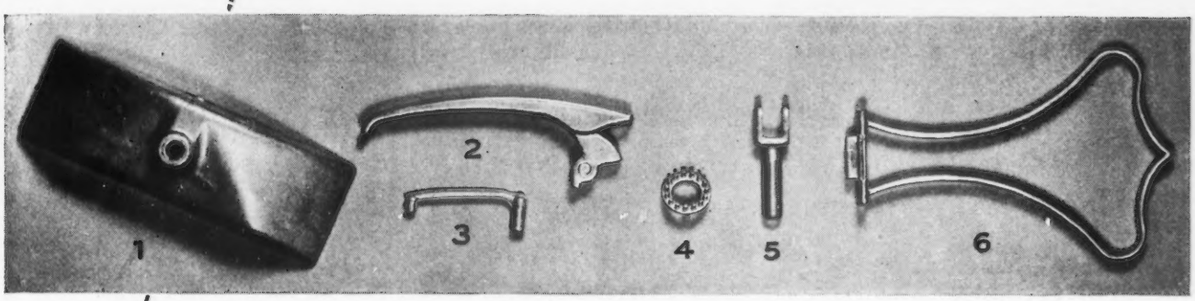


	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937
Total for Year	3,139,570	3,880,206	2,625,979	1,908,141	1,096,399	1,493,794	1,888,715			
Per Cent of 1929	80.7	100.0	67.6	49.4	26.2	38.6	49.0			
Projected								2,400,000	3,060,000	3,840,000
								61.8	78.8	99.3

SALES of new passenger automobiles in the United States are shown by the heavy line. The trend of monthly averages and the trend of peaks, together with the monthly average replacement on the basis of 1929 registration and car life, are also plotted. Total sales for each year and their relation in percentage to 1929 are indicated at the bottom of the chart.

Why 6 manufacturers switched to Revere Brass Forgings

(TWICE-WROUGHT)



Here are actual case histories of designing and production problems solved by Revere Brass Forgings (twice-wrought). They prove five outstanding advantages of these forgings: (a) Better metal and less of it. (b) Greater strength in a lighter part. (c) Accurate and uniform dimensions with consequent economy in machining. (d) Smooth surfaces and lower finishing costs. (e) Compact and uniform structure, providing great strength and non-porosity.

1. Here's a forging used for a tank-head of an automobile heater. Formerly, the manufacturer used a brass stamping and two steel castings assembled with rivets and soldered to give proper strength to the thin brass stamping. Revere made this forging, and thereby gave him a better and stronger part. Because of the elimination of the assembly operation, the forged part cost less.

2. This is an electric refrigerator door handle. The manufacturer chose to have this made as a forging rather than a casting for two reasons. It cost less to finish, and it could be made accurate enough to fit the assembly without the extra machining that a casting requires.

3. This part is an insert for a distributor in the engine of farm machinery. A forging was chosen because of its greater strength and lighter weight, and because it can be made more accurately to fit other parts of the assembly.

4. An electric clock motor manufacturer used this tiny part in an armature assembly. Formerly, he pierced two copper washers with holes and used 16 small rivets to assemble these washers with a steel washer. The forging proved to be cheaper because it was much simpler to assemble the piece, using the studs as rivets.

5. This eye-bolt, made from a Revere brass forging, is used in a steam pressure cooker. This bolt was changed over from a screw machine part to a forging to save metal. On a screw machine it was necessary to start with a relatively large square or rectangular rod and then remove considerable metal. As a forging the part can be made to size.

6. And finally, this brass forging provides the handle for a folding tidbit dish. A forging was selected because the ultimate cost was less, due to the ease with which the part could be polished and plated.

Why don't you profit by the advantages of Revere Brass Forgings? Our Technical Advisory Service will gladly cooperate with your designers and engineers to see if Revere can save money for your plant. Address our Executive Offices for details on this service.

Revere Copper *and* Brass

INCORPORATED

Founded by Paul Revere 1801

EXECUTIVE OFFICES: 230 PARK AVENUE, NEW YORK CITY · MILLS: BALTIMORE, MD. · TAUNTON, MASS.
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WHAT do you demand of a CONTINUOUS CONVEYOR

? ? ? ?

Smooth running?—Low maintenance?—Long life?—With the Wissco (U. S. Patent 1,952,973) Balanced Spiral Conveyor Belt you get all of these. Wissco Belts are made in a variety of metals and alloys to operate in high temperatures, under adverse chemical and atmospheric conditions and to carry products that would quickly destroy a belt made of ordinary metals. Wissco Belts will satisfy your demands.

WICKWIRE SPENCER STEEL COMPANY
NEW YORK CITY, BUFFALO, WORCESTER, CHICAGO, SAN FRANCISCO
Send for the Wissco Conveyor Belt Hand Book.

WISSCO CONVEYOR BELTS

1937, when sales exceed the annual replacement requirements on the 1929 basis, that the accumulated replacement during the depression will amount to 9,504,912 cars, necessitating an annual sales volume equal to 1929 for 20.9 years to overtake the replacement accumulation.

This chart is the work of E. W. Oliver, director of research and service of the St. Louis Southwestern Railway Lines, St. Louis, and is copyrighted by him. It is published herewith by permission.

Carnegie to Expand Merchant Iron Sales

JAMES S. McKESSON, formerly vice-president Corrigan, McKinney Steel Co., Cleveland, has been appointed special sales agent to handle exclusively all sales of pig iron for Carnegie Steel Co., Pittsburgh. The Carnegie company will immediately get into production and maintain a sufficient stock of Bessemer, basic, malleable and foundry iron to be able to meet all requirements of the trade. Mr. McKesson will maintain offices in Pittsburgh.

Inland Directors Call Special Meeting

DIRECTORS of Inland Steel Co. have approved a resolution calling for a special meeting of stockholders to be held Sept. 20 to vote upon the proposed merger with the Joseph T. Ryerson & Son, Inc.

Five-Day Courses in Welding Offered

A SPECIAL five-day course in welding engineering was initiated Aug. 26 in Cleveland by the John Huntington Polytechnic Institute in cooperation with the Lincoln Electric Co. The course will be conducted once each month, except during November, through May, 1936. It is designed to give engineers, welding supervisors and foremen an opportunity to engage in intensive study of both the practical and theoretical sides of arc welding.

The course will consist of day and evening sessions, the day sessions to be held at the plant of the Lincoln Electric Co and the evening sessions at the John Huntington Polytechnic Institute. Subjects will include: value and use of the electric arc; calculation and distribution of stresses in welded joints; study of polarized light and rubber weld models; penetration; designing for arc welding; estimating welding costs; and organizing the welding department. It is explained that this five-day course is not to be confused with the Lincoln Welding School which has been in regular session since 1917. Information relating to the course may be had from E. W. P. Smith, welding engineering department, John Huntington Polytechnic Institute, Cleveland.

PERSONALS

(CONTINUED FROM PAGE 269)

trial and product engineers in the application of the company's Wheelabrator.

❖ ❖ ❖

T. PHILLIPS, who since 1933 has been works manager at East Pittsburgh for the Westinghouse Elec-

HERBERT J. WATT, new district sales manager at New York for the Jones & Laughlin Steel Corpn., whose appointment was announced in these columns two weeks ago.

tric & Mfg. Co., has been appointed general works manager of the company. In his new position, he will serve as central authority for all manufacturing operations of the company. He joined the company in 1915 and has held various positions in plants located at Chicopee Falls, Mass., and in the Pittsburgh district. In 1930 he was appointed works manager of the Nuttall plant, Pittsburgh, and three years later became works manager at East Pittsburgh. He succeeds C. H. CHAMPLAIN, who has resigned owing to prolonged illness.

❖ ❖ ❖

WILLIAM STEYTLER has been appointed manager of sales, steel and and wire products, for Pittsburgh Steel Co., Pittsburgh, to fill the vacancy caused by the recent death of Hubert F. Hanks. Mr. Steytler has been connected with the company for 22 years and comes from the company's Detroit office where he has been district sales manager. WALTER D. SCHLUNDT succeeds Mr. Steytler as district sales manager at Detroit. Mr. Schlundt has been associated with the company for the past six years as representative in the Detroit territory.

How much TOO MUCH *are you paying*

FOR POWER DELIVERED TO YOUR MACHINES

That question you *must* answer. Yet, until you have worked out an analysis of your present costs, you cannot know how much you can save by using *the most economical power transmission system.*

There are just two modern power transmission systems in the industrial plant. One involves high investment costs and high operating and maintenance expense—putting a motor on every machine. Conditions may warrant this system in spite of extra cost, for it is usually more efficient than old-fashioned line-shaft drive.

BUT, wherever production may be arranged to group a number of machines around single larger motors, MGD (Modern Group Drive) is the only system which completely fits today's economic picture. MGD utilizes the diversity of power requirements of numerous machines to reduce the total power supplied and to use that power more efficiently; it is the most economical system to install, and the least costly to maintain.

If lowest cost can be obtained with present equipment, modernize your power transmission with MGD. If you can further reduce your manufacturing costs with new machines, cut capital and operating costs to the limit with MGD. The extra saving often makes it possible to buy now. And MGD meets F.H.A. loan requirements.

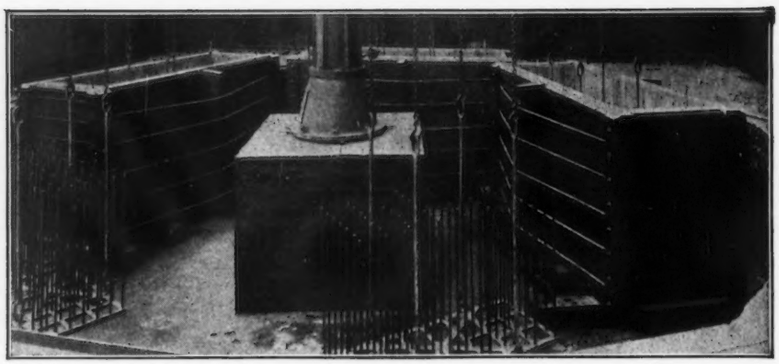
At your service are 3500 Power Transmission Counselors, who are cooperating daily with plant engineers, consulting engineers and public utility engineers in the modernization of industrial power transmission systems. Ask them to assist you, to survey without obligation your machinery drive problems. Meanwhile, send for a free copy of the famous Red Book, "A Practical Analysis of Some Fundamentals of Industrial Power Transmission". It will give you food for thought.

POWER TRANSMISSION COUNCIL
1 Atlantic Street, Stamford, Conn.

A research association of producers and distributors of power, power units and mechanical equipment for the transmission of power

MODERN PTC GROUP DRIVE

A POWER DOLLAR SAVED IS A PROFIT DOLLAR EARNED



WOOLFORD BUILT PICKLING TANKS ARE DEPENDABLE

Because only the most carefully selected material and experienced workmanship go into their construction.

G. WOOLFORD WOOD TANK MFG. CO. (FACTORY DARBY, PA.) **Paschall P. O., Phila., Pa.**

July Recession Less Than Seasonal

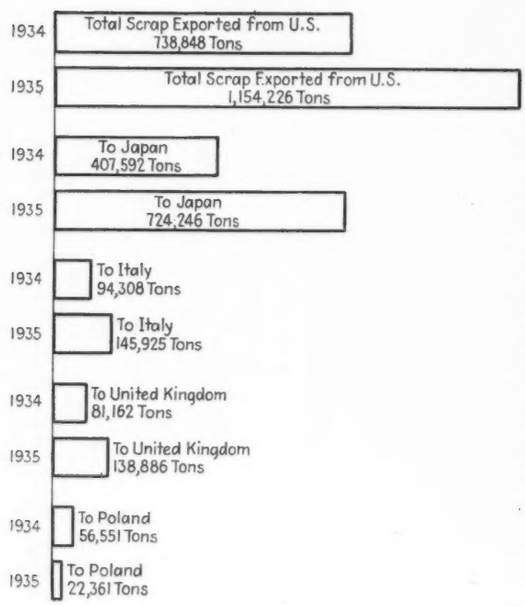
INDUSTRIAL production during July receded by slightly less than the usual seasonal amount, but recovered a considerable portion of this decline during the first half of August, according to the monthly Business Survey issued today by the National Industrial Conference Board. The only series among the Conference Board's selected indicators of production to show a greater-than-seasonal decline during July were those for petroleum, pig iron, and bituminous coal. On the other hand, such important indexes as motor production, building, steel activity, and electric power output were higher than might have been expected under normal seasonal conditions. In general, production continued well ahead of that for the corresponding period of last year.

Indexes of activity in the field of distribution and trade declined by somewhat more than the usual seasonal amount, but these also remained well above the level reported a year ago. Miscellaneous carloadings were 3.7 per cent lower than in June, but were 2.2 per cent higher than in July, 1934. Retail trade, as reflected by sales of department stores, variety stores, and mail order houses, declined measurably from the level of the preceding month.

For the first six months of the year merchandise exports amounted to $1,002,989,000 and were 1.5 per cent lower than in the first half of 1934. Imports during the same period totaled $984,450,000, or 18.4 per cent higher than in the corresponding period of 1934. The decline in exports was general in all classes of goods with the single exception of finished manufactures, which showed an increase during the half year of 10.7 per cent as compared with the first half of 1934. The increase in goods imported was general throughout the entire list.

Corporation profits during the first half of 1935 were, in general, higher than during the corresponding period of last year. The greatest gains were registered by producers of automobiles, machinery, electrical equipment, and by the construction industry. Coal mining was the only important industry to show lower earnings than a year ago. The gap which existed during the worst months of the depression between the annual rate of return in corporations producing goods for consumption and those engaged in the so-called heavy industries has been considerably narrowed during the past twelve months.

Scrap Exports and Principal Buyers In 1934 and 1935, January to June, Inclusive



AS portrayed in the accompanying graph, total scrap exports from the United States rose from 738,848 gross tons in the first six months of 1934 to 1,154,226 gross tons in the corresponding period in 1935. Japan continued to be the heaviest purchaser, with shipments in 1935 about 78 per cent above those in the first half of 1934. Poland was unique in that scrap deliveries showed a large decline.

The heavy scrap shipments to all countries for the first six months of 1935 do not necessarily mean that the same rate will continue throughout the remainder of the year. Japan now has too much scrap in its home markets and has ceased to buy for the time being. Italy is finding it difficult to secure adequate foreign credit and consequently shipments there may show a decline. The tonnage figures in the graph include tin plate scrap and waste-waste tinplate.

COORDINATION . .

● The *cadenza of the virtuoso* requires the utmost in skill and coordination. Without these, we have the wail of discords. Similarly, in steel making the high quality of the finished product depends upon skill and coordination. The correct use of the proper ferro-alloys is an important point of control.

Since 1906 Electromet has been making the right ferro-alloys. Electromet Metallurgists will show you how to use them under the right conditions. If you are not entirely familiar with this service, let us send you a copy of the folder "Electromet Products and Service." Write for it.

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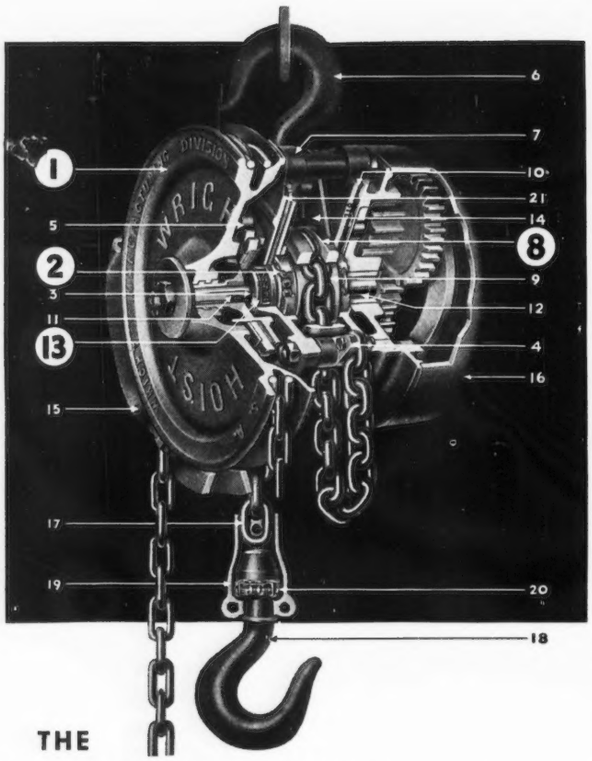

THE

Wright Hoist proves itself—point by point—to be the **right** hoist

● The Wright Improved High Speed Hoist has 21 points of superiority. Four of these points (Nos. 1, 2, 8 and 13 in the above illustration) will particularly impress you. **1.** The zinc-coated finish—found only on Wright Hoists. **2.** Precision ball bearings—positively grease-sealed with ground inner and outer races. **8.** Load-chain safety guard—which prevents load chain from riding out of pocket, regardless of position of hoist. **13.** Ball-bearing spindle—which increases efficiency, reduces wear and assures alignment at point of greatest speed. The four features alone assure that in the Wright Improved High Speed Hoist you get the *right* hoist. And you'll be just as much impressed by the rest of the 21 points. Write for full information on the Wright Improved High Speed Hoist and its application to your specific hoisting problem.

WRIGHT MANUFACTURING DIVISION OF THE AMERICAN CHAIN COMPANY, *Incorporated*
YORK, PENNSYLVANIA
In Business for Your Safety

ACCO

WRIGHT *Improved* High Speed Hoists

JUST BETWEEN US TWO

They Think It's Wonderful

VERY likely Mr. Heinz believes that the mouth that bites into another brand of pickle belongs to a head that should be examined. Mr. Chrysler must shake his head in wonderment over those who choose other than a Dodge, Chrysler or Plymouth. The same goes for Mr. Squibb and his toothpaste and so on.

While pride in product is natural and admirable, it does not make for exact calibration of the sense of values. You would not think, for example, of asking Mr. Marx, of Hart Schaffner & Marx, to list the first five makes of men's ready-made clothing in order of quality. You would suspect that Mr. Marx' personal interest would influence his judgment.

Pride in product is as rife in the trade paper field as elsewhere. Breathes there a publisher with soul so dead that he does not believe readers would wither and die without his paper? That is why you are perfectly right in salting generously any publisher's opinion of the importance of his paper to its readers.

And that is why we never tire of shouting from the housetops that independent investigations of reader-interest usually find The Iron Age standing in lonely eminence in the column headed, *"Publications found most useful."*

Cashes In on Bible

EVEN in the tolerant, superlative-hating Oberleutnant we detect signs of the overwhelming pride in product that must obsess Messrs. Heinz, Chrysler, Squibb and so on.

To him it seems inconceivable that anyone in the industry can continue to metabolize without reading The Iron Age. When confronted with evidence that this feat, while difficult, is not impossible, he bares his teeth and mutters, "How can such things be!"

For example, here is a New Jersey tool manufacturer who writes:

> ***"I do not have time to read any papers except the Bible; therefore, you can remove our name from your list.***
> ***"The Lord gave His promise 'My people shall prosper' and we are simple enough to believe in His promises and are cashing in without having the wisdom of this world."***

They Found the Key

ALTHOUGH the "transporting troops" problem (p. 91, Aug. 22 IA) was too much for the office mathematical genius, "Just-Between-Us-Two-ers" found it child's-play. A typical solution is that submitted by M. H. Collins of Samuel M. Langston Co., manufacturers of paper working machinery, Camden, N. J.:

"Tell your mathematical wizard to find the least common multiple of the figures from 1 to 10. When he gets this number, deduct one from it.

$$
\begin{array}{r}
1\ 2\ 3\ 4\ 5\ \mathbf{6}\ \mathbf{7}\ \mathbf{8}\ \mathbf{9}\ \mathbf{10} \\
2)6\ 7\ 8\ 9\ 10 \\
\hline
2)3\ 7\ 4\ 9\ 5 \\
\hline
3)3\ 7\ 2\ 9\ 5 \\
\hline
1\ 7\ 2\ 3\ 5
\end{array}
$$

$2 \times 2 \times 3 \times 1 \times 7 \times 2 \times 3 \times 5 = 2520 - 1 = 2519$ *men to be transported across the stream."*

Gumdrop Dipped in Vinegar

THE pig and feed man is in again. He thinks our puzzles are ridiculously easy, and, what is worse, proves it. But he takes out the sting by adding graciously:

> *"I do like The Iron Age. The editorials and articles on economics and economic problems are very good. They contain much sound, conservative sense that other sources of information often lack."*

Never Knew We Had One

THE "make-up" of a trade paper is like your stomach. When you are not conscious of it it is functioning satisfactorily.

Stodgy make-up tires your eyes. Bizarre typographical effects distract your eyes and interfere with the main purpose of the paper, which is to convey useful information as painlessly as possible from the printed page into your cerebrum.

A Western paper manufacturer writes:

> *"We have a customer who is very much impressed with the general make-up of The Iron Age. We are particularly anxious to secure information, etc. . . ."*

People who specialize in the arrangement of type and pictures frequently praise the make-up of The Iron Age. So rather than argue with experts we will admit that Frank Winters, who converts long galleys of type and stacks of cuts into neat pages, is good at his job.

Rest Your Feet

OUR booth at the Machine Tool Exposition, Cleveland, is A-1. Drop in when you feel you need a rest. If the chairs are all taken by members of the staff, announce yourself as a cash customer by giving the Fascist salute and a chair will be vacated for you immediately.—A.H.D.